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Trouble-shooting instructions: MB-537

BOSCH system : KE 2.3 - Jetronic

Make of vehicle : Mercedes-Benz

Basic microcard : MB-501

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1. Special features

This microcard contains the KE 2.3-Jetronic trouble-shooting instructions, valid at the time of publication, for the following Daimler-Benz model:

230 GE, 2.3 1/4-cyl. engine (EU) 08.85 →

- Trouble-shooting using these instructions can take place only if the data in the "Summary - Service Information for Vehicles" (Kfz-000) match up with those of the vehicle type and with the Bosch number of the KE-Jetronic control unit built in.
- Low-idle-speed control, electronic control unit integral in the KE-Jetronic control unit.
- Cold-starting control, the start valve is controlled by an additional function of the speed relay for the electric fuel pump. The thermo-time switch is not applicable.
- Engine-speed limitation at approx. 6350 min^{-1} through current polarity reversal as for overrun cutoff.
- Different speed-relay versions for vehicles with manually-shifted and automatic transmissions. Additional function for automatic transmissions: kickdown cutoff approx. 200 min^{-1} below rated speed.
- Basic microcard for comprehensive trouble-shooting: MB 501

Important note: When reference is made to a basic microcard, it must be noted that the test specifications must always be taken from the vehicle-related brief instructions.



2. TEST SPECIFICATIONS

Test step

Test specifications *

2.1 Electric fuel pump:

Fuel delivery:

min. 1100 cm³/min.

2.2 Fuel pressures:

Primary pressure

5.25...5.6 bar
(5.35...5.7 kgf/cm²)

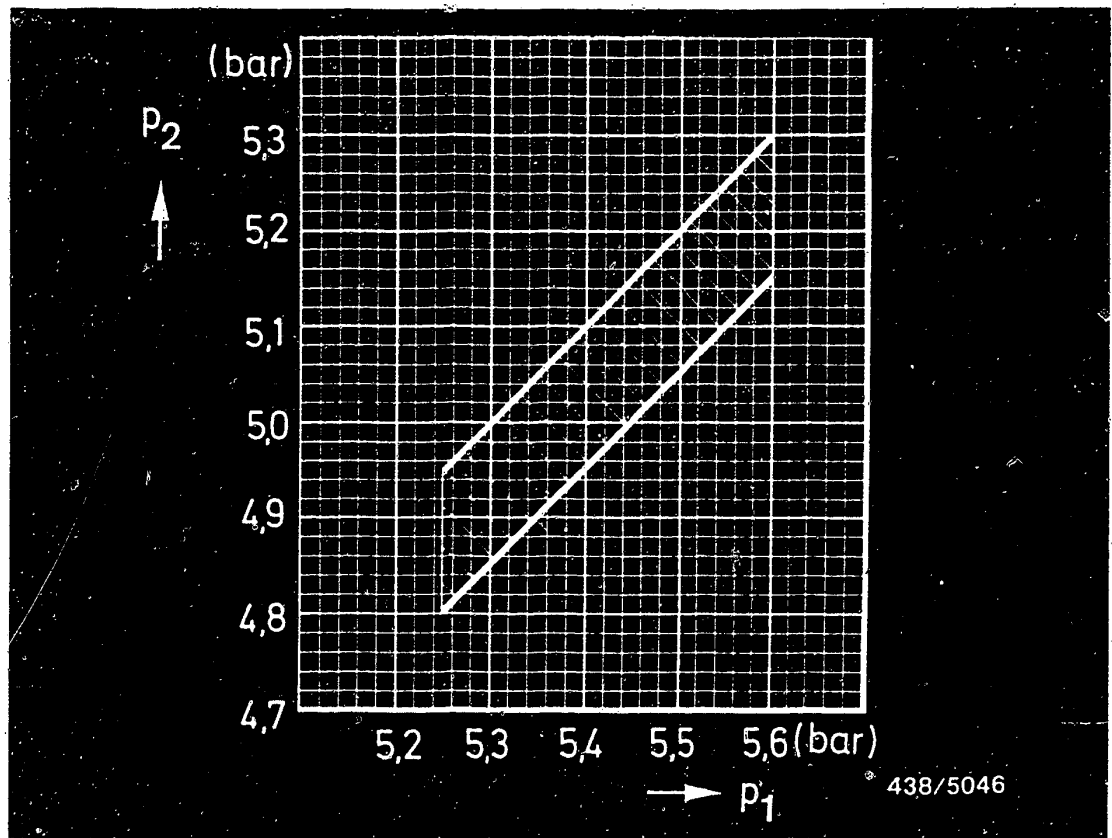
* Pressures in the test specifications are given in bar (gauge pressure) and in kgf/cm² (gauge pressure).

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Test specifications

MB 230 GE





P_1 = Primary pressure

P_2 = Lower-chamber pressure, actuator current = 0 mA

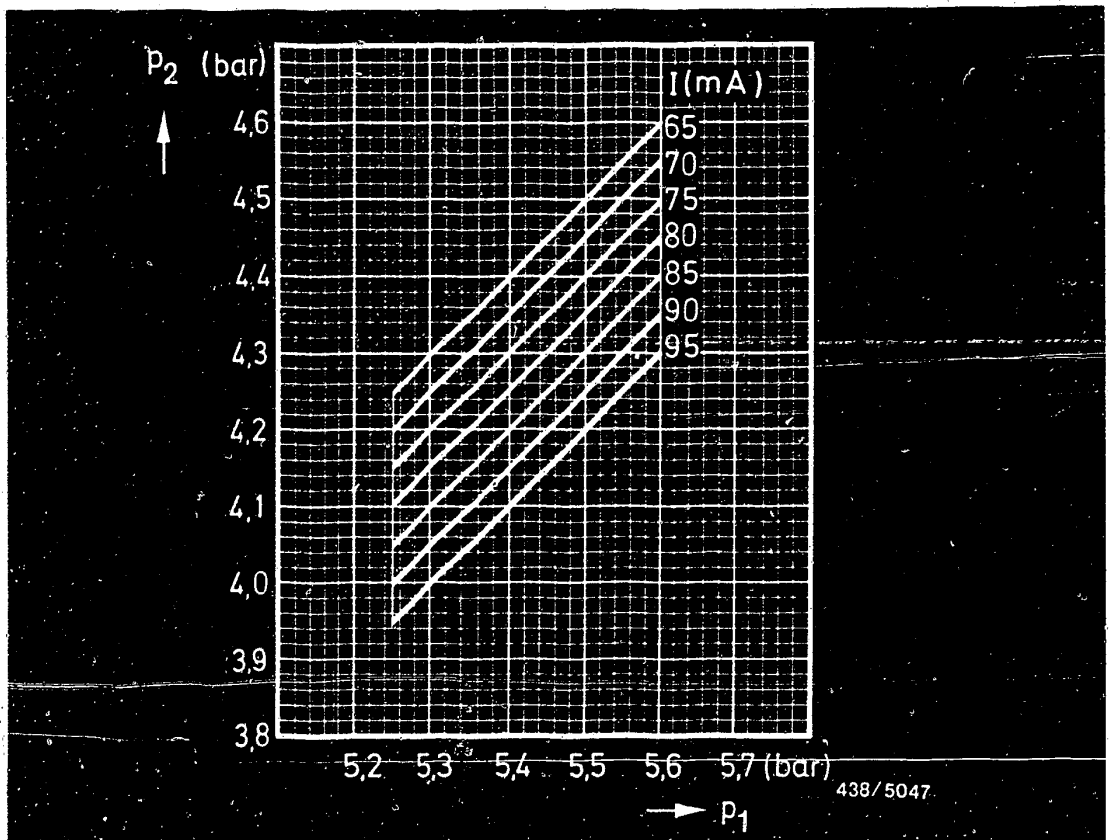
Differential pressure:

(Primary pressure / lower chamber pressure)

Take the test specification for "warm" lower chamber pressure from the graph according to the primary pressure measured.

The "warm" state is simulated by disconnecting the plug from the pressure actuator (actuator current 0 mA).





P_1 = Primary pressure

P_2 = Lower chamber pressure "cold"
Tolerance ± 0.15 bar

I = Actuator current

Take test specification for "cold" lower chamber pressure from graph according to primary pressure measured and according to actuator current measured.

The "cold" state is simulated by disconnecting the plug from the temperature sensor (NTC).

Connect plug to pressure actuator.

Test stepTest specifications *2.3 Leak test on overall fuel system

Minimum pressure
after 10 minutes: 2.7 bar (2.8 kgf/cm²)
after 20 minutes: 2.6 bar (2.7 kgf/cm²)

2.4 Injection valves

Opening pressure 3.0 ... 4.1 bar
(3.1...4.2 kgf/cm²)

2.5 Fuel distributor test

(Test with pressure actuator mounted.
Pressure actuator at zero current)

Comparative measurement of deliveries from outlets:	Setting point	Max. allowable delivery
Idle	6.0 cm ³ /min.	6.6 cm ³ /min.
Part load	40.0 cm ³ /min.	42.5 cm ³ /min.
Full load	100.0 cm ³ /min.	109.0 cm ³ /min.

Full-load delivery with maximum deflection
of air-flow sensor plate, measured with
measuring glass at outlet with the lowest
delivery at full-load measuring point: min. 140 cm³/min.

Flow rate of KE throttle
in fuel distributor: 130...145 cm³/min.

* Pressures in the test specifications are given in
bar (gauge pressure) and in kgf/cm² (gauge pressure).

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Test specifications

MB 230 GE



Test step

Test specifications

2.6 Temperature sensor

Resistance measurements:

Engine cold

Ambient temperature

(+ 15° C...+ 30° C):

1300 ... 3600 Ω

Engine at normal

operating temperature

(approx. + 80° C):

250 ... 390 Ω

2.7 Air-flow sensor potentiometer

Voltage signal with sensor

plate in basic position:

0.2 ... 0.3 V

2.8 Idle-mixture-adjusting screw - basic setting dimension

(Fuel distributor
support - needle
bearing):

21.1 ... 21.3 mm



2.9 Idle adjustment *

Idle speed (closed-loop controlled): 730 ... 830 min⁻¹

whereby on/off ratio to be set: 27 ... 29 %

Idle exhaust-gas value (CO): 0.5 ... 1.5 vol. %

* Note on idle adjustment:

In addition to the usual test equipment, the following is required:

- On/off ratio tester: e.g. Bosch lambda closed-loop tester KDJE-P 600 or Bosch pocket motortester KTE 001.03
- Bosch universal test adapter ETT 018.01 with KE-Jetronic test lead 1 684 463 135.

Connection of KDJE-P 600: directly to B+ and ground, blue test lead to red "V" socket of adapter. Press button "IR" on tester.

Connection of pocket tester: yellow B+. Green to red "V" socket of adapter. Switch position: "100 % ~~4~~".

To measure the on/off ratio, turn "V" switch on adapter to position 10.

The idle speed is automatically regulated by the idle speed control, but the on/off ratio at idle speed must be checked and, if necessary, corrected by adjusting the bypass screw on the idle actuator.

CO adjustment as usual by adjusting the idle-mixture-adjusting screw in the mixture-control unit.



3. Rapid diagnosis chart for universal test adapter
ETT 018.01 with KE-Jetronic test lead 1 684 463 135
and suitable multimeter

The following rapid diagnosis chart makes it possible for the experienced Jetronic expert to quickly check the electrical/electronic peripheral and control-unit functions of the KE-Jetronic.

Important notes on the following rapid diagnosis chart:




The "Test conditions" column shows for which test steps the control-unit plug must be connected or disconnected. Make absolutely sure that the ignition is off whenever connecting or disconnecting the control-unit plug.

The "Test connections" column provides information on the leads connected into the respective test circuit, referenced to the pin assignment in the control-unit plug.

Trouble-shooting, if necessary, refers to these leads.



Rapid diagnosis chart for universal test adapter ETT 018.01

Test step	Switch setting		But-ton	Object under test	Test connec-tions	Test conditions	Test specifications (Reading)
	V	Ω					
1		4	-	Pressure actuator internal resistance	12 - 10	Disconnect control-unit plug	21 ... 30 Ω
2		5	-	Temperature sensor internal resistance + 15° ... + 30° C: approx. + 80° C:	21 - 2	Control-unit disconnected	1.3 ... 3.6 k Ω 250 ... 390 Ω
3		11	-	Control unit output stage ground	20 - 2	Control-unit plug disconnected	0 ... 10 Ω
4	3	-	-	Starting signal from terminal 50 of ignition lock (with automatic transmission only)	16 - 2	Control-unit plug disconnected. Select drive mode. Briefly operate starting motor:	8 ... 15 V
5	4	-	-	Starting signal Terminal 50 of starting motor	24 - 2	Control-unit plug disconnected Briefly operate starting motor:	8 ... 15 V
6	5	-	-	TD signal (ignition)	25 - 2	Control-unit plug disconnected Operate starting motor for a few seconds:	Voltage value undefined
7	6	-	-	Control unit power supply	1 - 2	Control-unit plug disconnected. Switch on ignition:	8 ... 15 V

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Rapid. diag. chart to univ. test adapter
MB 230 GE



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Rapid. diag. chart to univ. test adapter
MB 230 GE



Rapid diagnosis chart for universal test adapter ETT 018.01 (continued)

Test step	Switch setting		But-ton	Object under test	Test connec-tions	Test conditions	Test specifications (Reading)
	V	Ω					
8	7	-	-	Power supply to po-tentiometer on air-flow sensor	18 - 2	Connect control unit. Switch on ignition:	7 ... 8 V
9	8	-	-	Potentiometer signal on air-flow sensor	17 - 2	Control unit connected. Switch on ignition. Deflect air-flow sensor plate by hand, whereby voltage rise to max. 8 V	0 ... 8 V
10	10	-	-	Idle actuator power supply and con-tinuity of winding 1	3 - 2	Switch off ignition. Disconnect control-unit plug. Switch on ignition.	8 ... 15 V
11	11	-	-	Idle actuator - continuity of winding 2	4 - 2	Control-unit plug disconnected. Switch on ignition.	8 ... 15 V
12	12	-	-	Air conditioner signal (if applic-able)	19 - 2	Control-unit plug disconnected. Switch on ignition. Switch on air conditioner:	8 ... 15 V
13	-	-	1	Warm-up enrichment - 20° C	12 - 12	<u>Current measurement!</u> Connection of measuring equipment: Negative = black socket 1 Positive = black socket 2 Connect control unit. Switch on ignition:	41 ... 62 mA

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Rapid. diag. chart to univ. test adapter
MB 230 GE



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Rapid. diag. chart to univ. test adapter
MB 230 GE



Rapid diagnosis chart for universal test adapter ETT 018.01 (continued)

Test step	Switch setting		But-ton	Object under test	Test connec-tions	Test conditions	Test specifications (Reading)
	V	Ω					
14	-	-	2	Actuator current corresponding to engine at normal operating temp.	12 - 12	Control unit connected. Switch on ignition:	0 ... 1 mA
15	-	-	2/4	Starting enrichment	12 - 12	Control unit connected. Switch on ignition. Press button 2 pressed. Then press button 4. Current rises to: Cut-back time:	50 ... 70 mA approx. 1.5 sec
16	-	-	1/4	Post-start enrichment	12 - 12	Control unit connected. Switch on ignition. Press button 1 and keep pressed: Press button 4. Current rises to: After a short period, cut-back (approx. 90 s) to:	41 ... 62 mA 80 ... 125 mA 41 ... 62 mA
17	-	-	1/6	Acceleration enrichment	12 - 12	Control unit connected. Switch on ignition. Keep both buttons pressed: Rapidly deflect air-flow sensor plate by hand. Current rises to: Cut-back approx. 1.5 seconds to:	41 ... 62 mA 130...150 mA 41 ... 62 mA

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Rapid. diag. chart to univ. test adapter
MB 230 GE



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Rapid. diag. chart to univ. test adapter
MB 230 GE



Rapid diagnosis chart for universal test adapter ETT 018.01 (continued)

Test step	Switch setting		But-ton	Object under test	Test connections	Test conditions	Test specifications (Reading)
	V	Ω					
18	-	-	2	Overrun cutoff	12 - 12	<p>Control unit connected.</p> <p>Change over terminals of ammeter. (Swap positive and negative; not necessary for measuring instrument with automatic polarity change-over.)</p> <p>Start engine and hold at approx. 2500 min⁻¹.</p> <p>With button 2 pressed, actuate idle throttle-valve switch by hand.</p> <p>Single speed drop until cut-in speed.</p> <p>Current reading during the falling engine-speed phases:</p> <p>With cruise control (if applicable) on, there must be no overrun cutoff.</p> <p>In this case, after the cruise control has been switched on, positive (8...15 V) must be applied to pin 6 of the control-unit plug</p>	-40 ... -50 mA
19	-	-	2	Full-load enrichment	12 - 12	<p>Control unit connected.</p> <p>Disconnect lead plug of throttle-valve switch, full load, and jump both connections at control end.</p> <p>Start engine.</p> <p>Press button 2.</p> <p>Current reading at idle speed:</p> <p>Raise engine speed. As of approx. 1000 min⁻¹:</p> <p>As of approx. 2100 min⁻¹ to approx. 6800 min⁻¹:</p>	<p>0 ... 1 mA</p> <p>Current rise</p> <p>3 ... 6 mA</p>

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Rapid. diag. chart to univ. test adapter
MB 230 GE



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Rapid. diag. chart to univ. test adapter
MB 230 GE



Rapid diagnosis chart for universal test adapter ETT 018.01 (continued)

Test step	Switch setting		But-ton	Object under test	Test connections	Test conditions	Test specifications (Reading)
	V	Ω					
20	10	-	-	Idle speed control	3	<p>Test with on/off ratio tester, e.g.: Lambda closed-loop tester KDJE-P 600 or Bosch pocket motortester KTE 001.03</p> <p>Connection of lambda closed-loop tester: Large clips directly to vehicle battery red +, black -, blue test lead to red "V" socket or test well of adapter. Press button "IR" on tester.</p> <p>Connection of pocket motortester: Yellow clip directly to vehicle battery +, green clip to red "V" socket or test well of adapter. Switch position on tester = "100 % 4".</p> <p>Warm up engine and operate at idle speed.</p> <p>Idle speed (closed-loop controlled): whereby on/off ratio:</p> <p>If necessary, adjust on/off ratio (bypass screw on idle actuator)</p> <p>Switch on air conditioner (if applicable):</p> <p>Disconnect idle throttle-valve switch plug:</p> <p>Select drive mode (automatic transmission):</p>	<p>730 ... 830 min⁻¹ 27 ... 29 %</p> <p>680 ... 780 min⁻¹</p> <p>800 ... 1050 min⁻¹ (30 ... 33%)</p> <p>630...730 min⁻¹ (31 ... 33%)</p>
				Idle speed control correction functions			

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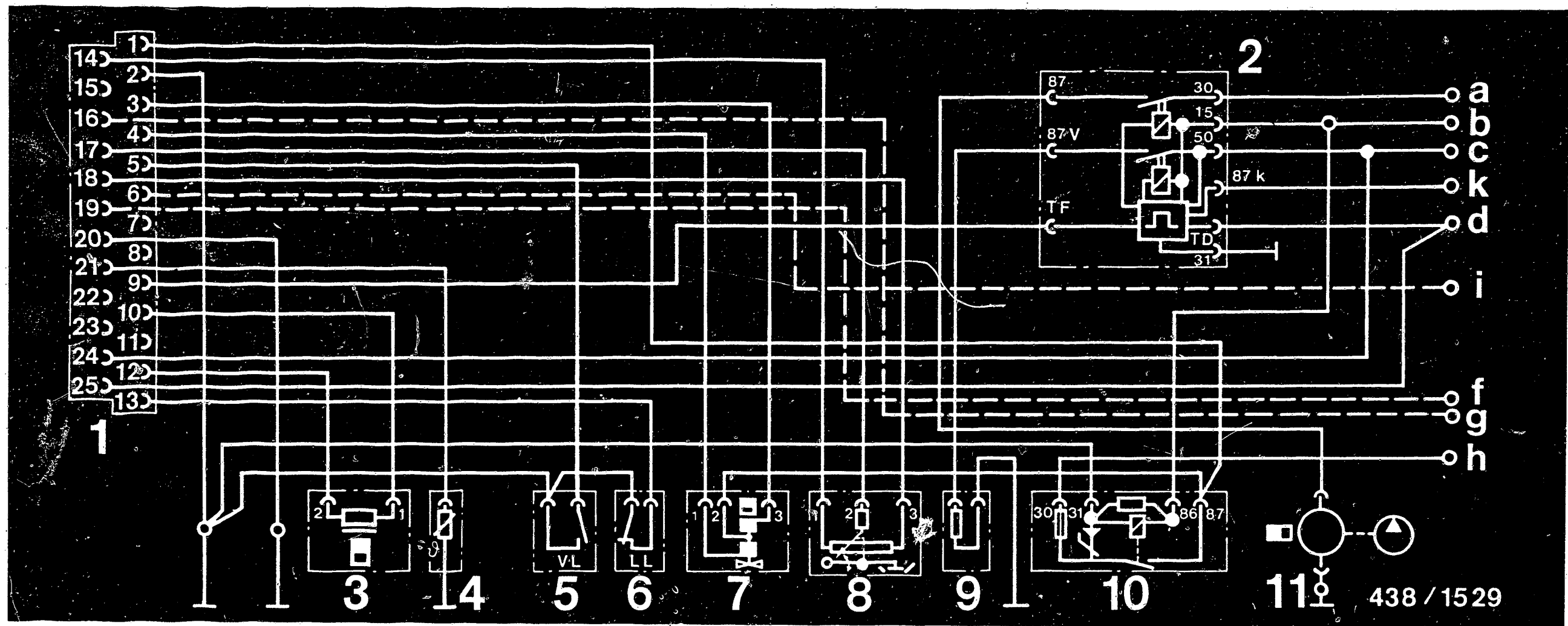
Rapid. diag. chart to univ. test adapter
MB 230 GE



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Rapid. diag. chart to univ. test adapter
MB 230 GE





4. Electrical terminal diagram with electric fuel pump safety circuit

- 1 = KE-Jetronic control unit
- 2 = Electronic relay for energization of electric fuel pump and start valve
- 3 = Electrohydraulic pressure actuator
- 4 = Temperature sensor
- 5 = throttle-valve switch
- 6 = Throttle-valve switch (microswitch on linkage)
- 7 = Idle actuator
- 8 = Potentiometer on air-flow sensor
- 9 = Start valve
- 10 = Electronics relay with overvoltage protection
- 11 = Electric fuel pump

- a = Terminal 30, single cable connector, B+
- b = Terminal 15, central-electrics box, connector U, socket 5
- c = Terminal 50, engine cable connector (pin 7)
- d = Terminal TD ignition, diagnosis cable connector socket
- f = Signal from air conditioner (if applicable)
- g = Terminal 50, ignition lock, with automatic transmission or engine ground, with manual transmission
- h = Terminal 30, single cable connector, B+
- i = Signal from cruise control (if applicable)
- k = Kickdown switch, socket 1 (through engine cable connector pin 9)

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Electrical terminal diagram

MB 230 GE



A21

Electrical terminal diagram

MB 230 GE



- Jumping the electrical safety circuit:

The safety circuit is to be jumped for all pressure and flow tests.

The electronic relay of the safety circuit (for electric fuel pump and cold-starting control) is positioned together with the over-voltage protection relay in the equipment compartment (at left seen in forward direction of travel, in the central electrics)

To jump it, disconnect the relay from the relay socket.

Connect sockets 7 (87) and 8 (30) with a connecting lead (1.5 mm², and a fuse element with a 16 A fuse). This supplies the electric fuel pump with battery voltage.

Important:

To test the control unit functions, it is sufficient to switch on the ignition.

In this case, the safety circuit must not be jumped.

This ensures that no fuel is injected when the air-flow sensor plate is moved.

This would lead to serious engine damage when the engine is subsequently started.



6. Installation position of components

(Components on engine predominantly the same as in 230 E)

Mixture-control unit:	above intake manifold and throttle-valve assembly
Primary-pressure regulator:	between intake ports 1 and 2
Injection valves:	in the flanges of the intake ports
Electric fuel pump, filter, accumulator:	at vehicle floor, in area of fuel tank
Temperature sensor (NTC):	on cylinder head, single round-pin plug
Control unit, KE-Jetronic:	in footwell, passenger's side
Fuel-pump relay:	in central electrics, in equipment compartment, at left (forward direction of travel).
Idle actuator:	between intake ports 3 and 4
Idle/full-load throttle-valve switch FL:	on throttle-valve assembly, throttle shaft
Idle microswitch LL:	on throttle linkage, in area in front of mixture-control unit.

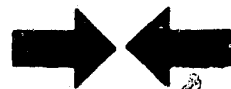


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BOSCH system : L2-Jetronic

Make of vehicle : Volkswagen

Basic microcard : VWV-503

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Special features

This microcard contains the L2-Jetronic trouble-shooting instructions for the following VW models valid at the time of writing:

- Type 25 Caravelle Carat Injection
- Type 24, 25 Transporter Injection
- Type 24, 25 Transporter Syncro Injection
with 2.1 l / 4-cyl. opposed-cylinder engine, 82 kW,
Europe version, 3.85 →
- L2-Jetronic with 25-pin digital control unit
0 280 00 522/523, triggered from term. 7 of the TCI
trigger box
- 4-pin air-flow sensor
- Safety circuit with main and pump relays
- Start control
- Overrun cut-off starting at engine temperature
+60°C
- Solenoid-operated fuel-injection valves with brass-
wire coil
- Throttle-valve switch with double cam for idle
speed and full load
- Idle-speed control (non-Bosch product)
- Digital idle-speed stabilizing (non-Bosch product)

Note:

- Similar SIS repair instructions:
SIS microcard VWV-503

Important note: When referring to a basic microcard, observe that the test specifications should always be taken from the vehicle-specific brief instructions.



RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

- Universal Test Adapter 0 684 101 801 and
- Adapter Lead 1 684 463 156

The following rapid diagnosis chart enables the experienced L-Jetronic specialist to rapidly check the electric portion of the system with the universal test adapter.

The rapid diagnosis chart contains the following information:

- Test step sequence
- Position of V- and Ω -program switches
- Notes on the operation of the universal test adapter or other components.
- Test values for engine tester and multimeter



Rapid diagnosis chart for universal test adapter (continued)

When testing with the universal test adapter and the L2 adapter cable, only peripherals are tested.

Test step	Switch position		Measurement	Measurement at control-unit plug between terminals	Remarks	Test specifications (reading)
	V	Ω				
1	4	-	Voltage from ignition-and-starting switch term. 50	21 and 7	Disengage gear and start	<u>8 ... 15 V</u>
2	5	-	t _D signal from term. 7 of TCI trigger box	1 and 7	Disengage gear and start	<u>2 ... 8 V</u>
3	6	-	Voltage at main relay, term. 87	13 and 7	Disengage gear and start	<u>8 ... 15 V</u>
4	7	-	Ground signal at pump relay term. 87	20 and 7	Disengage gear and start	<u>8 ... 15 V</u>

B4

Rapid diagnosis chart

VW



B5

Rapid diagnosis chart

VW



Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position	Measurement	Measurement at control-unit plug between terminals	Remarks	Test specifications (reading)
	V Ω				
5	↓	5	Resistance of temperature sensor (engine temperature NTC II)	2 and 7	(+15°C...+30°C): 1.45 ... 3.3 kΩ (+80°C): 280 ... 360 Ω
6	↓	6	Resistance of temperature sensor (intake-air temperature NTC I) in air-flow sensor	14 and 7 (6)	Term. 6 and term. 7 are connected to each other in the adapter cable. (+15°C...+30°C): 1.45 ... 3.3 kΩ (+80°C): 280 ... 360 Ω
7	↓	7	Resistance of potentiometer in air-flow sensor	15 and 7 (6)	Deflect sensor flap to stop 8 ... 1000 Ω
8	↓	8	Resistance in air-flow sensor	19 and 7 (6)	500 ... 800 Ω
9	↓	9	Resistance of throttle-valve switch	4 and 7	Accelerator pedal at rest 0 ... 10 Ω Slightly depress accelerator pedal ∞Ω Fully depress accelerator pedal 0 ... 10 Ω
10		11	Resistance of ground output stage	25 and 7	0 ... 10 Ω

B6

Rapid diagnosis chart

VW



B7

Rapid diagnosis chart

VW



Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		Measurement	Measurement at control-unit plug between terminals	Remarks	Test specifications (reading)
	V	Ω				
11	↓	12	Resistance of 1st solenoid-operated fuel-injection valve and electric fuel pump	12 and 7	Connection of term. 7 with ground via electric fuel pump	Ambient temperature (+15°C...+30°C): 14 ... 24 Ω Engine at operating temperature (+80°C): 16 ... 26.5 Ω
12	↓	13	Resistance of 2nd solenoid-operated fuel-injection valve and electric-fuel pump	11 and 7		
13	↓	14	Resistance of 3rd solenoid-operated fuel-injection valve and electric fuel pump	24 and 7		
14	↓	15	Resistance of 4th solenoid-operated fuel-injection valve and electric fuel pump	23 and 7		

B8

Rapid diagnosis chart

VW



B9

Rapid diagnosis chart

VW



Test specifications

Pressure regulator

- Fuel pressure 2.3...2.7 bar

Electric fuel pump

- Fuel delivery (measured in return) min. 650 cm³/30s
- Terminal voltage (under load): min. 12 V

Temperature sensor (engine NTC II)
and temperature sensor I (intake air NTC I) in
air-flow sensor between (terms. 1 and 4)

- Electrical internal resistance at:
Ambient temperature (+15°...+30°C): 1.45...3.3 k Ω
Engine at operating
temperature (approx. +80°C): 280...360 Ω

Solenoid-operated injection valve

- electrical internal resistance
at (+15°...+30°C) 15...17.5 Ω

Air-flow sensor

- electrical internal resistance
between term. 2 and term. 3
(sensor flap fully deflected): 8 ...1000 Ω
between term. 3 and term. 4 500...800 Ω

Start control with NTC II plug connection pulled.
Connect ignition lead term. 4 to ground via 5 k Ω
interference suppressor and spark gap.

- Terminal voltage at an injection valve: Falls from
initially greater than 2.5 V within approx. 15 s
starting time to approx. 0.3 V.



Idle setting

Engine at operating temperature, approx. +80°C.
Pull off hose for crankcase ventilation at oil breather and seal tightly.

● Idle speed

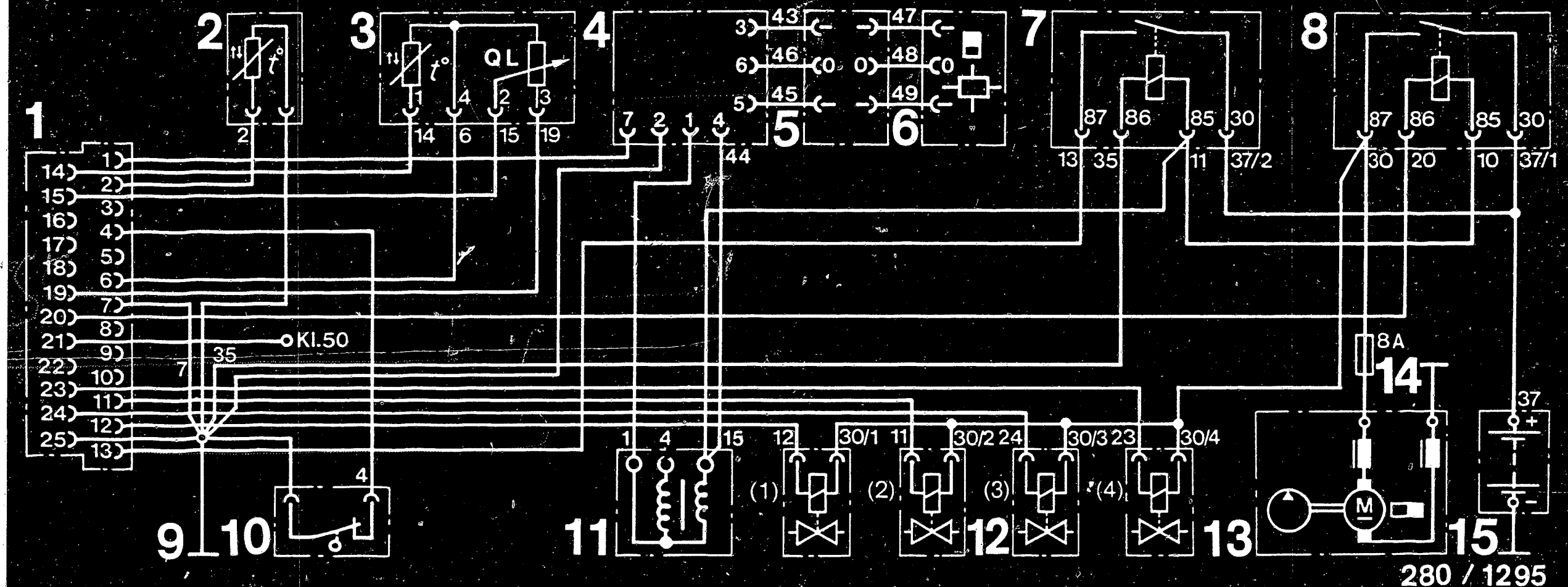
Pull plug connection from ignition coil term. 1 to control unit for idle-speed control (non-Bosch product).

Pull both plugs from DLS control unit and connect together. 750 ... 850 min⁻¹

● CO content 1.5 ... 2.5 vol.%CO

For setting values for ignition, valve clearance, and other technical engine data, see equipment and autodata microcard.





Electrical terminal diagram

- 1 = Control-unit plug
- 2 = Temperature sensor
(engine temperature NTC II)
- 3 = Air-flow sensor
- 4 = TC trigger box
- 5 = Digital idle stabilizer
(DLS)

- 6 = Ignition-pulse generator
- 7 = Main relay
- 8 = Pump relay
- 9 = Central ground
- 10 = Throttle-valve switch
(double cam for idle speed
and full load)

- 11 = Ignition coil
- 12 = Solenoid-operated fuel-injection
valves
- 13 = Electric fuel pump
- 14 = Pump fuse
- 15 = Battery

B 12

Electrical terminal diagram

VW

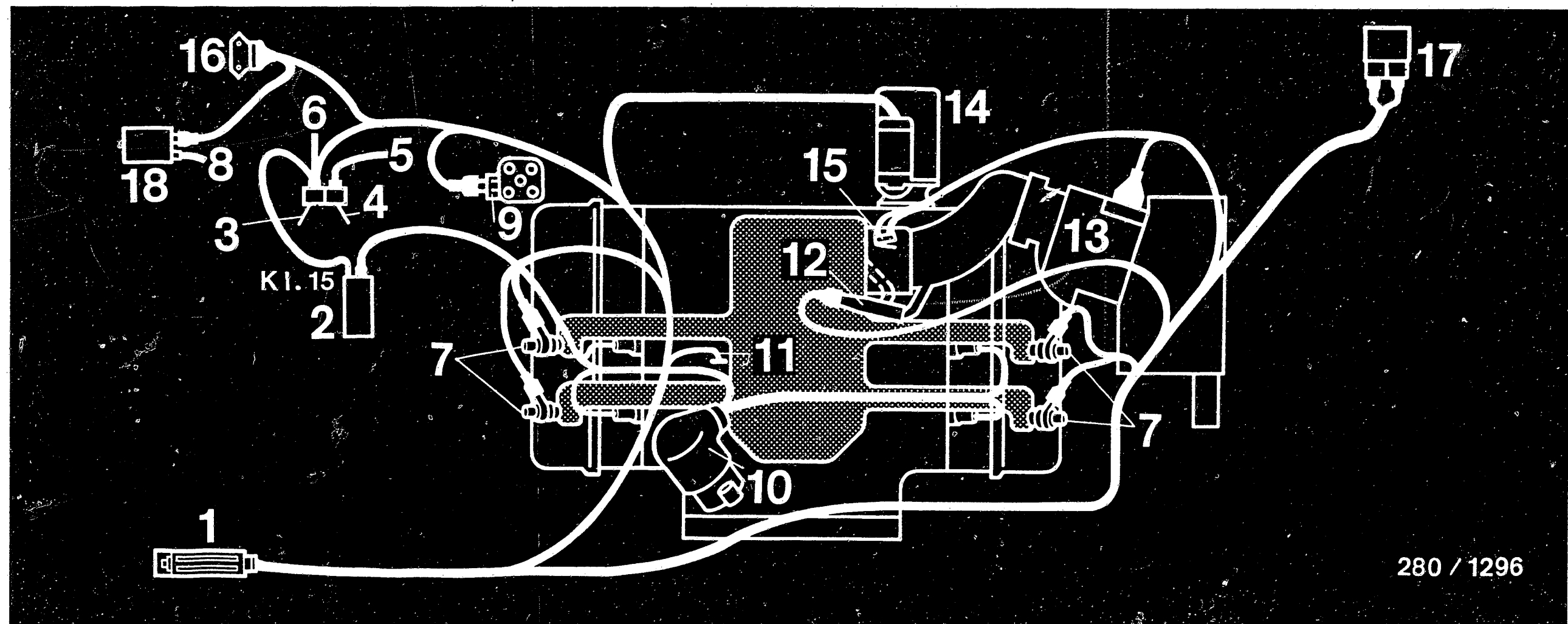


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Electrical terminal diagram

VW





Electrical wiring diagram and arrangement of individual components

- 1 = Control-unit plug
- 2 = Ignition coil
- 3 = Main relay
- 4 = Pump relay
- 5 = To electric fuel pump
- 6 = To battery term. 30
- 7 = Solenoid-operated fuel-injection valves
- 8 = To pulse generator
- 9 = Temperature sensor
(engine temperature NTC II)

- 10 = Ignition distributor
- 11 = Ground terminal
- 12 = Idle-speed setting device
- 13 = Air-flow sensor
- 14 = Starting motor
- 15 = Throttle-valve switch
- 16 = Ignition trigger box
- 17 = Idle-speed regulator (control unit)
- 18 = Digital idle stabilizer (DLS)

B 14

Electrical wiring diagram

VW

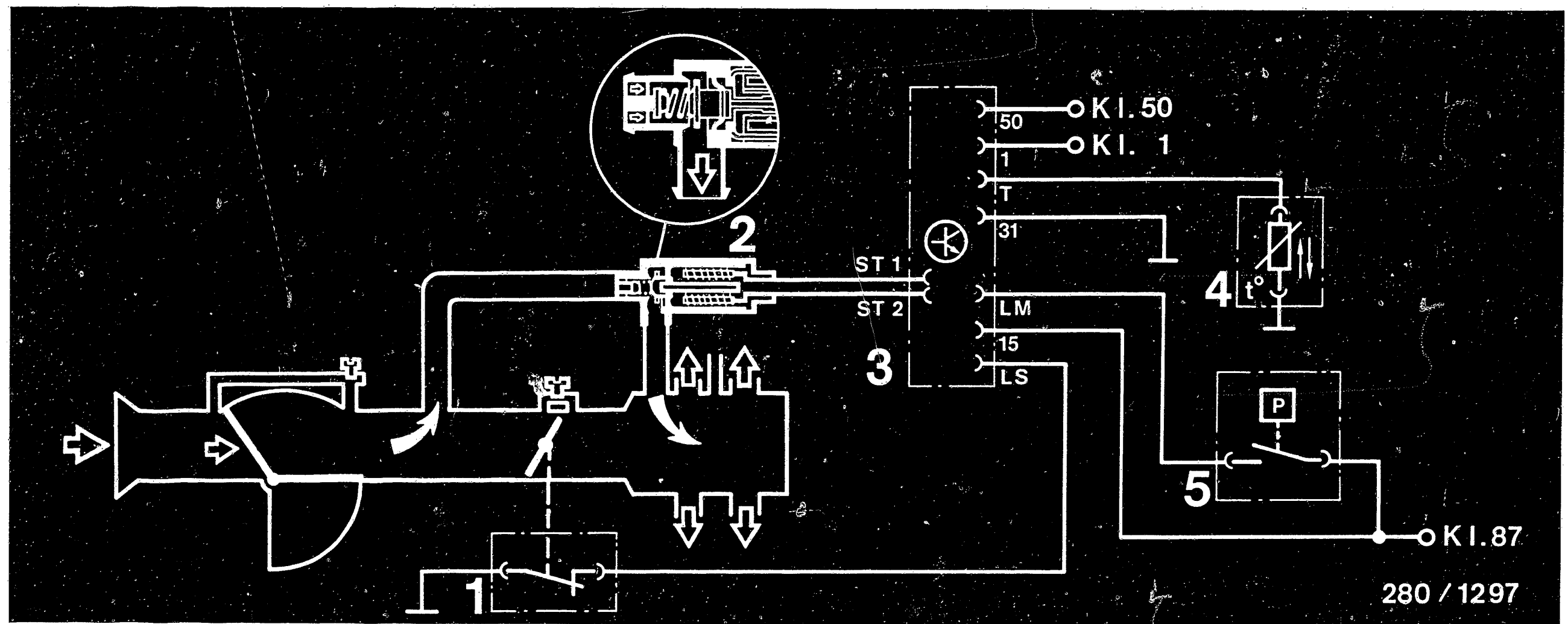


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Electrical wiring diagram

VW





280 / 1297

Idle-speed control (non-Bosch product)

- 1 = Throttle-valve switch (double cam for idle speed and full load)
- 2 = Idle-speed setting device

- 3 = Idle-speed regulator (control unit)
- 4 = Temperature sensor NTC II
- 5 = Pressure switch (power steering)

Operating principle: If the engine speed differs from the setpoint stored in the idle controller, the idle actuator is opened/closed more or less as the case may be. This regulates the air flow for operation at idle when the throttle valve is closed. The current engine speed is signalled from terminal 1 of the ignition coil. The control unit makes a comparison. Result: e.g. engine speed too low. The idle controller increases the output current for the idle actuator which is then opened wider, increasing the air throughput and opening the sensor flap. The engine speed rises.

The temperature sensor provides information on the engine operating temperature. Data sensors for engine-speed increase are: pressure switch (for power-assisted steering), A/C switch and starter-immobilization switch on vehicles with automatic transmission when a drive mode is selected.

B 16

Idle-speed control

VW



B 17

Idle-speed control

VW



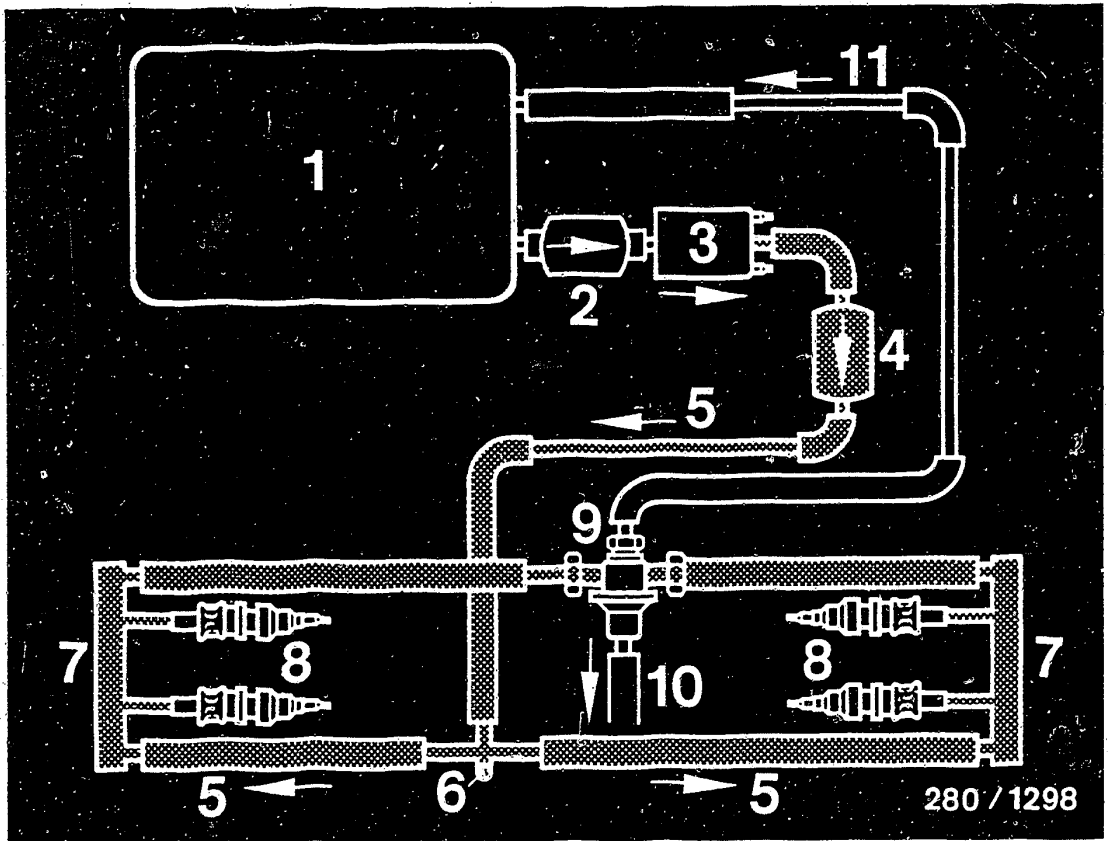
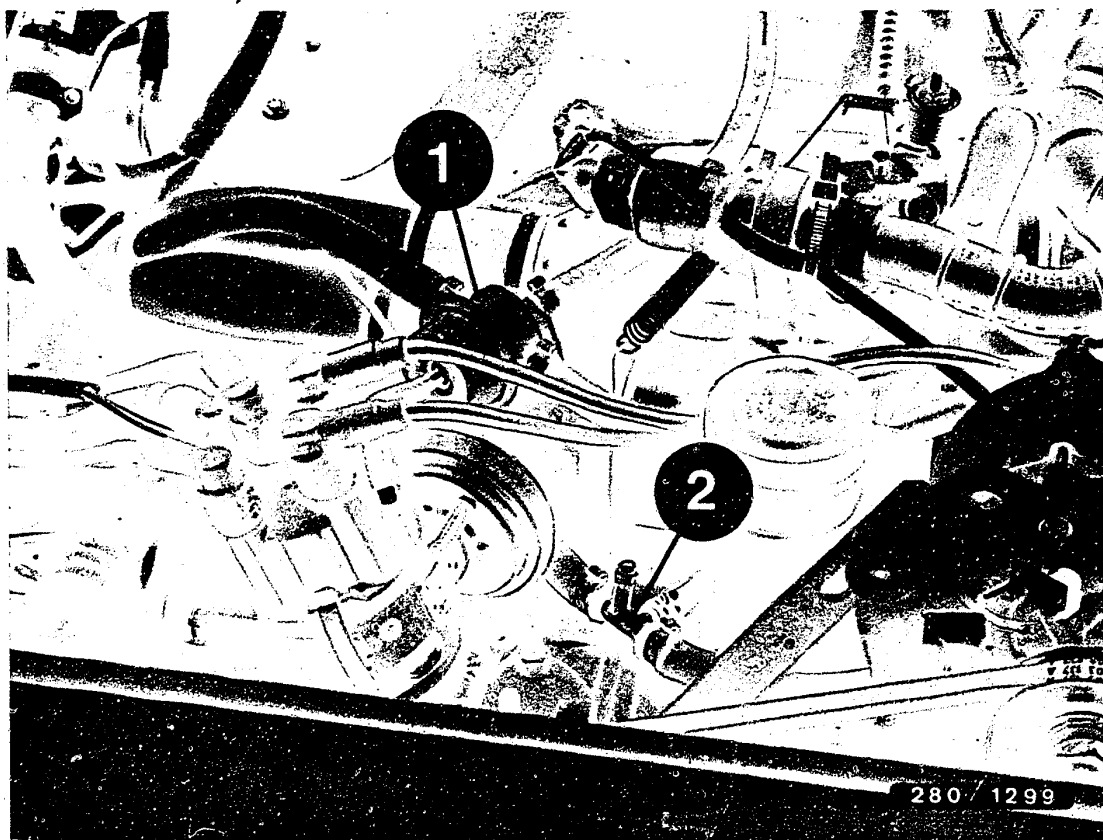


Diagram of fuel lines

Non-pressurized
 Fuel pressure

- 1 = Fuel tank
- 2 = Intake fuel filter (EU)
- 3 = Fuel pump
- 4 = Fuel filter (US)
- 5 = Fuel delivery line
- 6 = Connection for pressure-measuring device
- 7 = Fuel-distribution pipe
- 8 = Injection valves
- 9 = Pressure regulator
- 10 = to intake manifold
- 11 = Fuel return line





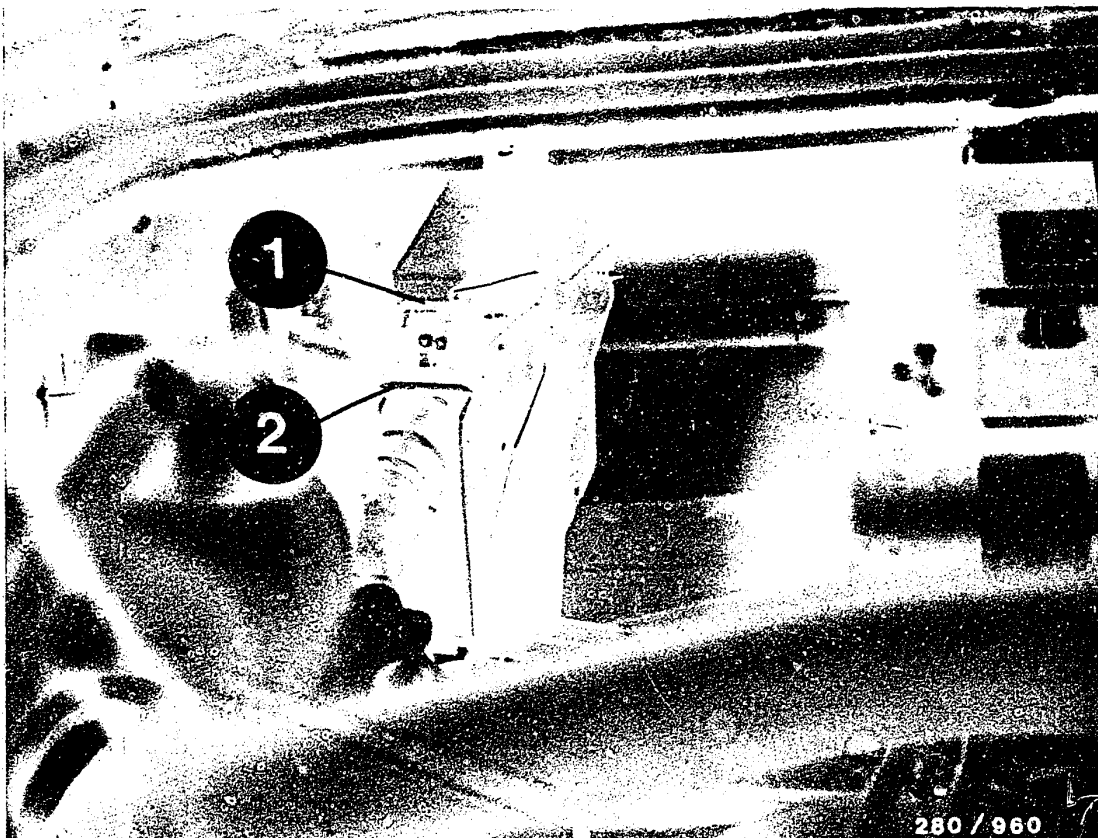
- 1 = Pressure regulator
2 = Fuel-delivery distributor

Fuel-line-pressure test

Use manometer and hose line from pressure-measuring device KDJE-P 100 for pressure testing. Screw three-way line KDJE-P 100/13 onto it and seal free tailpieces with hose line and spring clip.

Unscrew screw on fuel-delivery distributor. Make sure that no fuel gets on hot engine parts. Position three-way line on fuel-delivery distributor and secure with hose clamp.





- 1 = L2 control unit
2 = Locking spring

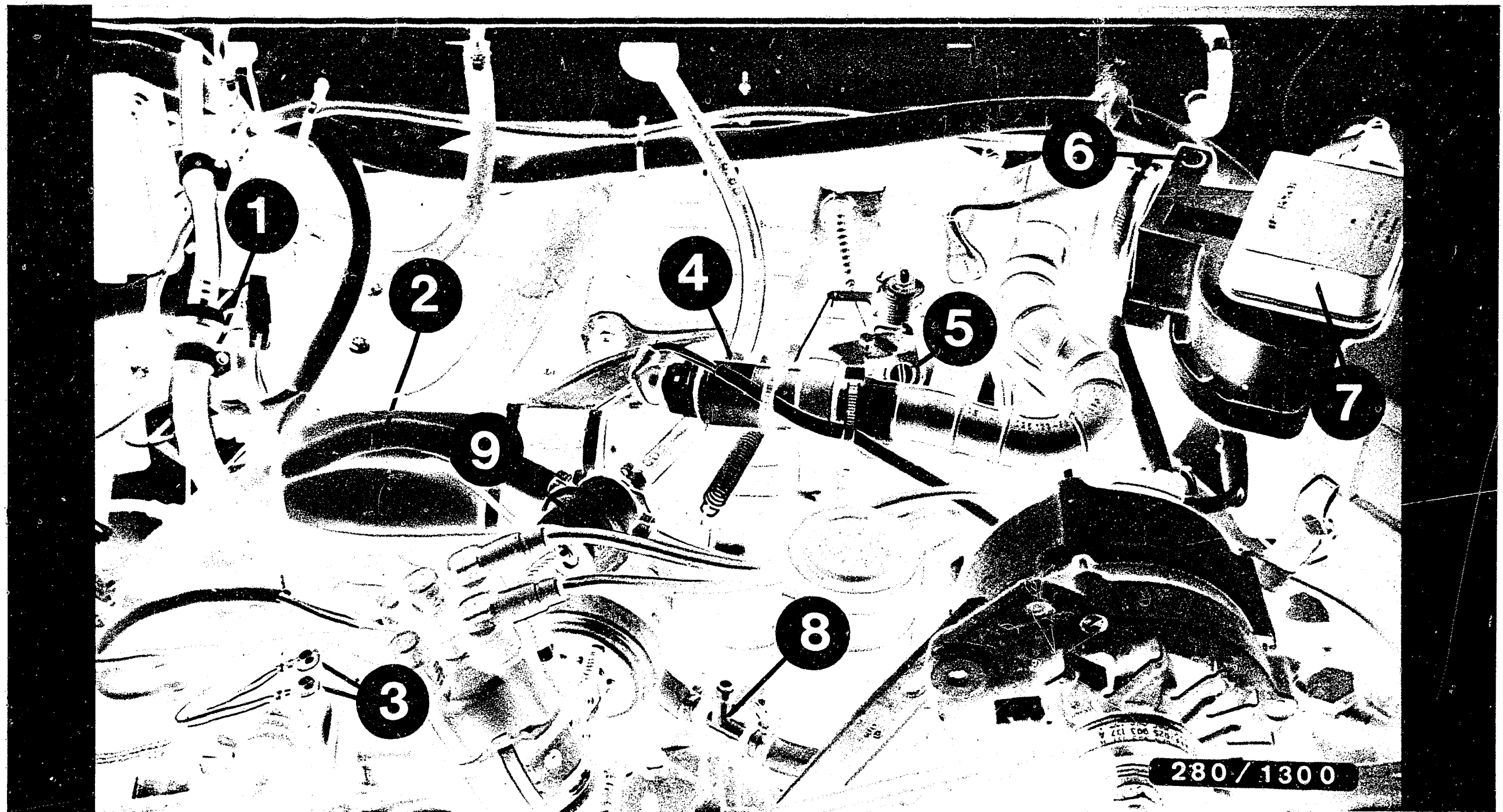
Installation position of components

Position information is always in relation to direction of travel.

The control unit is located in the engine compartment on the left behind the left tail lamp.

To remove the control unit, the tail lamp on the left must be removed. For testing, push the locking spring up and pivot the plug downwards.





280 / 1300

Arrangement of components on engine

- 1 = To temperature sensor (NTC II)
on thermostat housing
- 2 = To solenoid-operated fuel-injection
valves
- 3 = To central ground

- 4 = Idle-speed setting device
- 5 = Idle-speed screw
- 6 = Idle-CO screw
- 7 = Air-flow sensor

- 8 = Fuel-delivery distributor with
pressure-measurement connection
- 9 = Pressure regulator

B21

Installation position of components

VW

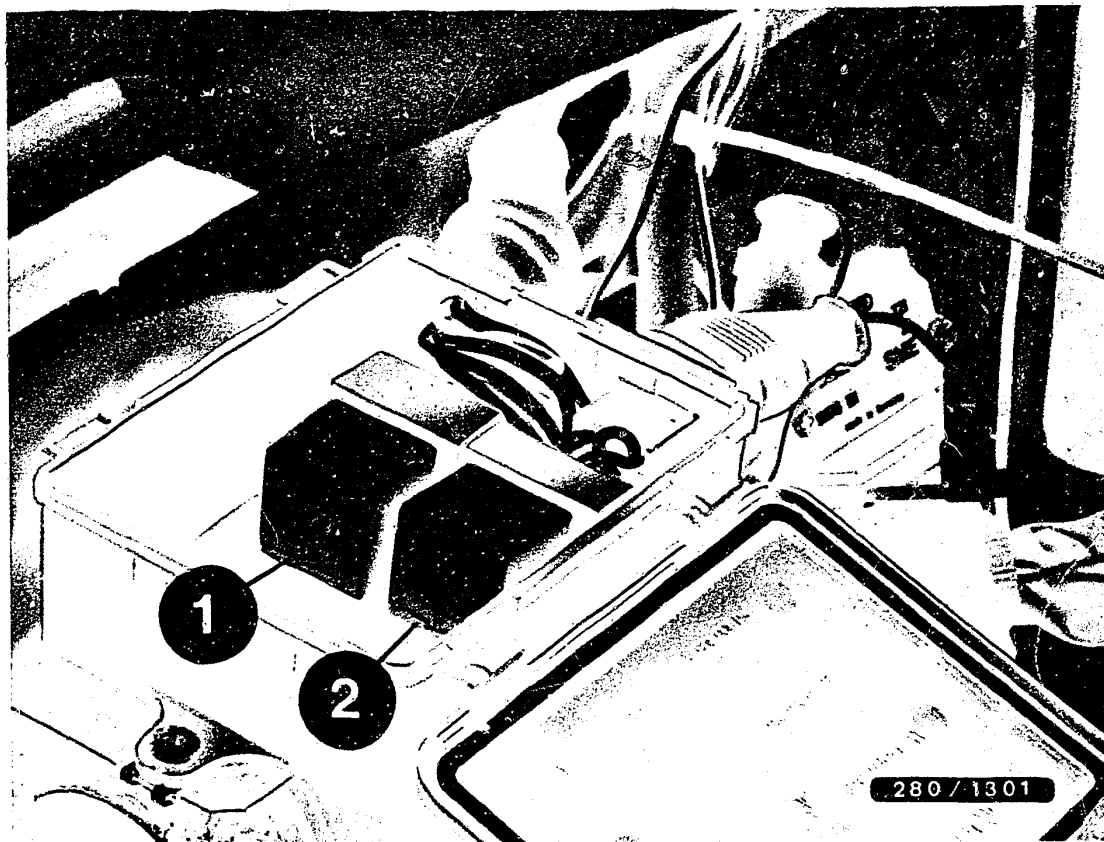


B22

Installation position of components

VW

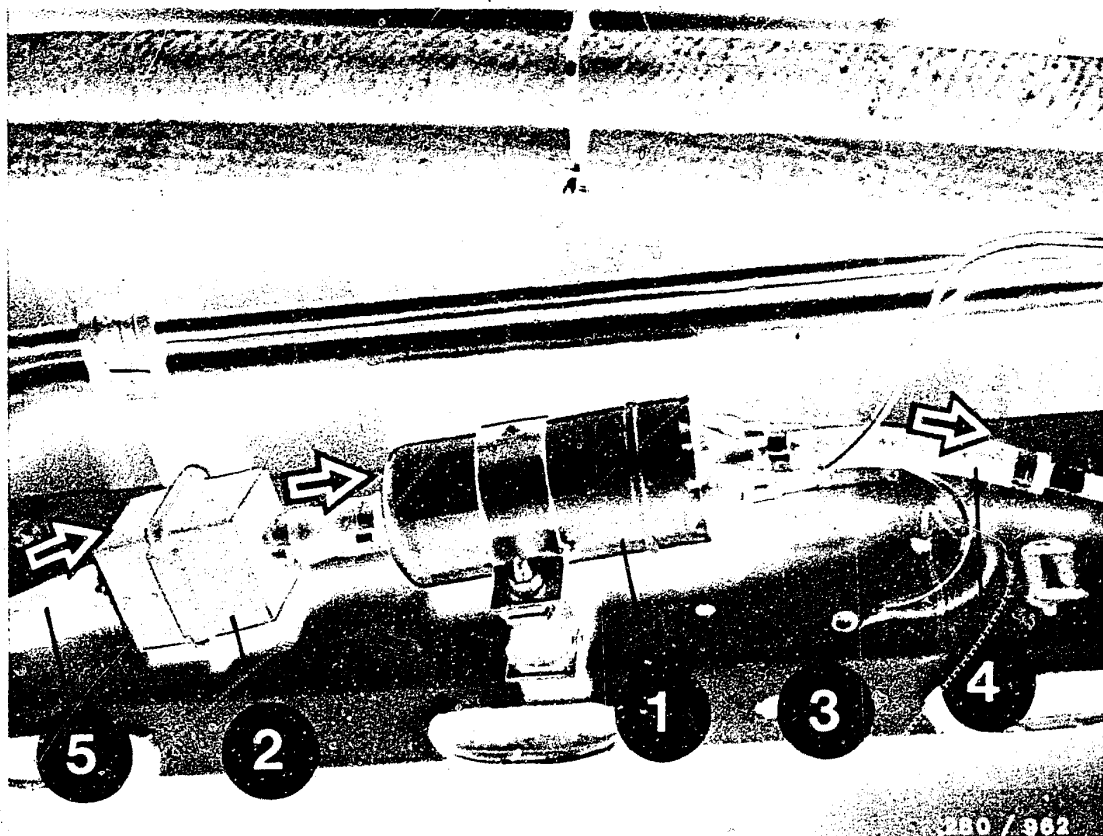




1 = Main relay
2 = Pump relay

- The throttle-valve switch is fastened to the bottom of the throttle-valve assembly.





- 1 = Electric fuel pump
- 2 = Intake fuel filter
- 3 = Ground connection (electric fuel pump)
- 4 = Fuel delivery line
- 5 = Fuel suction line

Arrow = Direction of fuel flow



TABLE OF CONTENTS

Trouble-shooting instructions: LAI-502

BOSCH system : ABS

Make of vehicle : Lancia

Basic microcard : BMW-501

Section	Coordinates
1. Special features	2
2. Test specifications	2
3. Test conditions	2
4. Rapid diagnosis chart	4
5. Electrical terminal diagram	18
6. Installation position of components	18
7. Necessary test equipment and tools	22
7.1 Additional equipment	24



1. SPECIAL FEATURES

These ABS instructions can be used for testing all Lancia Thema vehicles (as of 11.84). Further details can be found in the similar, detailed SIS instructions BMW-501 (6 series).

2. TEST SPECIFICATIONS

For reasons of safety, the ABS may only be tested using the ABS tester.

The rapid diagnosis chart contains all important test specifications as well as notes on testing and troubleshooting.

3. TEST CONDITIONS FOR TESTING WITH ABS TESTER

- The tester must have been converted to the latest technical status (identification "U2" on nameplate or as of FD 352).
- Check ground connections of return pump and overvoltage protection relay term. 31 for security and corrosion.
- Check hydraulic connections and joints on hydraulic modulator for leaks (visual examination).
- If the ABS warning lamp comes on occasionally while driving (e.g. after switching on electrical devices) and goes out again by itself, check battery and power supply (alternator, regulator and voltage drops).



- If the ABS warning lamp is constantly lit and does not go out, check the following points:
 - Is multiple plug correctly seated on control unit and is it latched in?
All plug contacts O.K.?
Spring contacts latched?
 - V-belt broken? (Alternator not supplying any voltage, charge indicator and ABS warning lamps on)
 - Voltage from alternator terminal 61?
Plug-in connector and lead to ABS control unit O.K.?
 - Check for loose contacts at wheel-speed sensors with program switch in position 10.
- For testing with the tester, switch on the ignition for all program switch positions (tester works on power supply from vehicle battery).
- Watch lamps 1 and 2 of tester for all program switch positions.

Caution:

Do not drive with the tester connected.
Whenever repairs have been carried out, repeat the entire test program.

General information on trouble-shooting

Check all leads for short circuit to ground and contact with positive leads, and also watch for worn spots and pinching.

- Connect ABS tester to control unit and ABS wiring harness.

Caution:

Disconnect and connect the control unit only with the ignition off.
The control unit is installed under the glove shelf.



4. RAPID DIAGNOSIS CHART FOR ABS TESTER

Switch on ignition for all program switch positions.

<u>Program switch position</u>	<u>Testing of</u>	<u>Additional operation</u>	<u>Test specifications (Reading)</u>	<u>Cause of trouble</u>
1 ... 24	Power supply for each test step	-----	Lamp 1 (green) must be lit for each test step.	<ul style="list-style-type: none"> ● Battery insufficiently charged. Repeat test step with engine running. ● Overvoltage protection relay defective. ● Check 4-pin plug (near control unit). ● High voltage drops at terminals (e.g. ground terminal). ● Open circuit in ground connection.
1	Valve relay off-position	-----	Lamp 1 (green) and lamp 3 (green) must be lit.	<ul style="list-style-type: none"> ● Open circuit or high contact resistance in leads (including ground lead) to valve relay. ● Valve relay defective.
2	Valve relay operation	-----	Lamp 1 (green) and lamp 3 (green) must be lit.	
3	Motor relay off-position	-----	Lamp 1 (green) and lamp 3 (green) must be lit.	<ul style="list-style-type: none"> ● Open circuit or high contact resistance in leads to motor relay. ● Motor relay defective. ● Check pump motor for continuity,
4	Motor relay operation	Press illuminated key	Lamp 1 (green) and lamp 3 (green) must be lit. Pump motor running.	

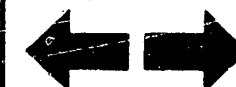
C4

Rapid diagnosis chart
Lancia Thema



C5

Rapid diagnosis chart
Lancia Thema



<u>Program switch position</u>	<u>Testing of</u>	<u>Additional operation</u>	<u>Test specifications (Reading)</u>	<u>Cause of trouble</u>
5	Overvoltage protection relay (built-in fuse and unidirectional-breakdown diode only)	Switch off ignition. Disconnect control unit. By means of adapter lead, connect overvoltage protection relay from vehicle in socket on tester. Connect identical new overvoltage protection relay in vehicle. Switch on ignition. Press illuminated key.	Lamp 1 (green) and lamp 3 (green) must be lit.	<ul style="list-style-type: none"> The overvoltage protection relay in the socket on the tester is defective.
6	Internal resistances of solenoid-operated valves in hydraulic modulator	Switch off ignition. Re-connect control unit. Switch on ignition. Press key FL Press key FR Press key RL Press key RR	Lamp 1 (green) must be lit. FL: 0.7 ... 1.7 Ω FR: 0.7 ... 1.7 Ω RL: 0.7 ... 1.7 Ω RR: 0.7 ... 1.7 Ω	<ul style="list-style-type: none"> Open circuit or high contact resistance in leads to the respective valve. Hydraulic modulator defective.
7	Ground connection to term. 10	Press illuminated key	Lamp 1 (green) must be lit. 80 ... 300 mV	<ul style="list-style-type: none"> Open circuit or high contact resistance in ground lead or ground terminal.
8	Ground connection to term. 34	Press illuminated key	Lamp 1 (green) must be lit. 10 ... 250 mV	
9	Ground connection to term. 20	Press illuminated key	Lamp 1 (green) must be lit. 10 ... 250 mV	



Program switch setting	Testing of	Additional operation	Test specifications (Reading)	Cause of trouble
10	Internal resistances of wheel-speed sensors	Press key FL Press key FR Press key RL Press key RR	Lamp 1 (green) must be constantly lit. FL : 0.6 ... 1.6 k Ω FR : 0.6 ... 1.6 k Ω RL : 0.6 ... 1.6 k Ω RR : 0.6 ... 1.6 k Ω	<ul style="list-style-type: none"> • Check for loose contacts: Move all leads at fastening points, at plug and at wheel-speed sensor, and watch reading. • Open circuit or high contact resistance in leads to the respective wheel-speed sensor. • Respective wheel-speed sensor defective.
11	Insulation resistances of wheel-speed sensors	Press key FL Press key FR Press key RL Press key RR	Lamp 1 (green) must be constantly lit. FL : 20 ... 999 k Ω FR : 20 ... 999 k Ω RL : 20 ... 999 k Ω RR : 20 ... 999 k Ω	<ul style="list-style-type: none"> • Check for insulation damage in leads to the respective wheel-speed sensor. • Respective wheel-speed sensor defective.
12	DC voltage on wheel-speed sensor leads	Press key FL Press key FR Press key RL Press key RR	FL : 000 ... 100 mV FR : 000 ... 100 mV RL : 000 ... 100 mV RR : 000 ... 100 mV	<ul style="list-style-type: none"> • Check leads to the respective wheel-speed sensor for contact (worn spot) with a positive lead. • Respective wheel-speed sensor defective.
13	Internal control unit supply voltage.	Press illuminated key	4.75 ... 5.25 V	<ul style="list-style-type: none"> • Control unit defective.



<u>Program switch position</u>	<u>Testing of</u>	<u>Additional operation</u>	<u>Test specifications (Reading)</u>	<u>Cause of trouble</u>
14	Diode in forward direction and ABS warning lamp		0.4 ... 1.5 V ABS warning lamp in vehicle must be lit	<ul style="list-style-type: none"> ● Open circuit or contact resistance in leads to diode and/or warning lamp. ● Warning lamp defective. ● Diode (hydraulic modulator) defective
15	Diode in reverse direction		2.5 ... 8.5 V	<ul style="list-style-type: none"> ● Check 4-pin plug (near control unit). ● Diode (hydraulic modulator) defective
16	Control unit BITE* triggering	Press illuminated key for 3 seconds	Warning lamp must go out after max. 1 second	● Control unit defective.
17	Control unit, BITE* fault simulation	Press illuminated key for 3 seconds	Warning lamp must still be lit (flickering allowable).	● Control unit defective.
18	Control unit, current for pressure holding	Press key FL, press illuminated key, press key FR, press illuminated key, press key RL, press illuminated key. press key RR, press illuminated key	FL : 1.9 ... 2.3 A FR : 1.9 ... 2.3 A RL : 1.9 ... 2.3 A RR : 1.9 ... 2.3 A	● Control unit defective.
19	Control unit, current for pressure reduction	Press key FL, press illuminated key, press key FR, press illuminated key, press key RL, press illuminated key. Press key RR, press illuminated key.	FL : 4.5 ... 6.0 A FR : 4.5 ... 6.0 A RL : 4.5 ... 6.0 A RR : 4.5 ... 6.0 A	● Control unit defective.
24	Voltage from stop-lamp switch	Press brake pedal	10 ... 15 V	<ul style="list-style-type: none"> ● Check 4-pin plug (near control unit). ● Lead to stop-lamp switch defective. ● Stop-lamp switch defective. ● Stop lamps defective.

* BITE = Built-in test equipment

C10

Rapid diagnosis chart

Lancia Thema



C11

Rapid diagnosis chart

Lancia Thema



A brake analyzer is required for program switch positions 20, 21, 22, and 23. Do not drive with the tester connected.
Do not use a brake-pedal actuating device for setting the braking force. Program switch position 23 must come first.

Front axle

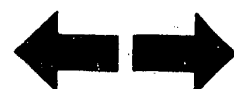
Drive front wheels of vehicle onto brake analyzer. Pull on handbrake.

<u>Program switch position</u>	<u>Testing of</u>	<u>Additional operation</u>	<u>Test specifications (Reading)</u>	<u>Cause of trouble</u>
23	Wheel-speed sensor signal and identity check	Press key FL, switch on left-hand brake roller.	<u>FL : 1.7 ... 19</u>	<ul style="list-style-type: none"> ● Wheel-speed sensors mixed up? ● Air gap too great. ● Respective wheel-speed sensor defective.
		Press key FR, switch off left-hand brake roller, switch on right-hand brake roller.	<u>FR : 1.7 ... 19</u>	
20	Hydraulic modulator pressure reduction and identity check	Press key FR. Switch on right-hand brake roller. Press brake pedal and hold constant at 2000 N. Press illuminated key.	<u>FR : less than 1100N</u>	<ul style="list-style-type: none"> ● End reading may change by max. 200 N in 3 sec. ● Brake lines mixed up? ● Conventional braking system O.K.? ● Hydraulic modulator defective. <p>Note: Replace hydraulic modulator only as a complete unit. Repairing is not allowed. Danger!</p>
		Press key FL. Switch off right-hand brake roller. Switch on left-hand brake roller. Press brake pedal and hold constant at 2000 N. Press illuminated key.	<u>FL : less than 1100N</u>	
21	Hydraulic modulator pressure buildup	Press key FL. Switch on both brake rollers. Press brake pedal and hold constant at 2000 N. Allowable difference between both wheels max. 500 N. Press illuminated key.	Left-hand brake analyzer reading moves to an intermediate value and rises again to <u>FL: 600 ... 1500 N</u>	

C12

Rapid diagnosis chart

Lancia Thema



C13

Rapid diagnosis chart

Lancia Thema



<u>Program switch position</u>	<u>Testing of</u>	<u>Additional operation</u>	<u>Test specifications (Reading)</u>	<u>Cause of trouble</u>
21	Hydraulic modulator pressure buildup	Press key FR. Switch on both brake rollers. Press brake pedal and hold constant at 2000 N. Press illuminated key	Right-hand brake analyzer reading moves to an intermediate value and rises again to <u>FR : 600 ... 1500 N</u>	<ul style="list-style-type: none"> ● End reading may change by max. 200 N in 3 secs. ● Brake lines mixed up? ● Conventional braking system O.K.? ● Hydraulic modulator defective. <p>Note: Replace hydraulic modulator only as a complete unit. Repairing is not allowed. Danger!</p>
22	Hydraulic modulator pump delivery, brake circuit 1	Switch on brake rollers. Read off inherent friction value on right. Press key FR. Press brake pedal and hold constant at 2000 N. Press illuminated key.	After an intermediate value on the right, return pump switches on briefly. Reading on right must drop below inherent friction value plus <u>200 N.</u> Press illuminated key until reading rises again to 2000 N.	<ul style="list-style-type: none"> ● Hydraulic modulator defective. <p>Note: Replace hydraulic modulator only as a complete unit. Repairing is not allowed. Danger!</p>
	Hydraulic modulator pump delivery, brake circuit 2	Switch on brake rollers. Read off inherent friction value on left. Press key FL. Press brake pedal and hold constant at 2000 N. Press illuminated key.	After an intermediate value on the left, return pump switches on briefly. Reading on left must drop below inherent friction value plus <u>200 N.</u> Press illuminated key until reading rises again to 2000 N.	



Rear axle:

Drive rear wheels of vehicle onto brake analyzer.

Release hand brake.

In vehicles with automatic transmission, selector lever to position "N".

Program switch position	Testing of	Additional operation	Test specifications (Reading)	Cause of trouble
23	Wheel-speed sensor signal and identity check	Press key RL, switch on left-hand brake roller. Press key RR, switch off left-hand brake roller, switch on right-hand brake roller.	RL: 1.7 ... 19 RR: 1.7 ... 19	<ul style="list-style-type: none"> • Wheel-speed sensors mixed up? • Air gap too great. • Respective wheel-speed sensor defective.
20	Hydraulic modulator pressure reduction and identity check	Press key RR. Switch on right-hand brake roller. Press brake pedal and hold constant at 1500 N. Press illuminated key. Press key RL. Switch off right-hand brake roller. Switch on left-hand brake roller. Press brake pedal and hold constant at 1500 N. Press illuminated key.	RR: less than 800 N RL: less than 800 N	<ul style="list-style-type: none"> • End reading may change by max. 200-N in 3 sec. • Brake lines mixed up? • Conventional braking system O.K.? • Hydraulic modulator defective. <p><u>Note:</u> Replace hydraulic modulator only as a complete unit. Repairing is not allowed. Danger!</p>
21	Hydraulic modulator pressure buildup	Press key RL. Switch on both brake rollers. Press brake pedal and hold constant at 1500 N. Allowable difference between both wheels max. 400 N. Press illuminated key. Press key RR. Switch on both brake rollers. Press brake pedal and hold constant at 1500 N. Press illuminated key.	Left-hand brake analyzer reading moves to an intermediate value and rises again to RL: 500 ... 1400 N Right-hand brake analyzer reading moves to an intermediate value and rises again to RR: 500 ... 1400 N	

Finally, conduct a road test.

With the engine running, the indicator lamp must go out. Drive at at least 30 km/h.

The indicator lamp must not come on again.

C 16

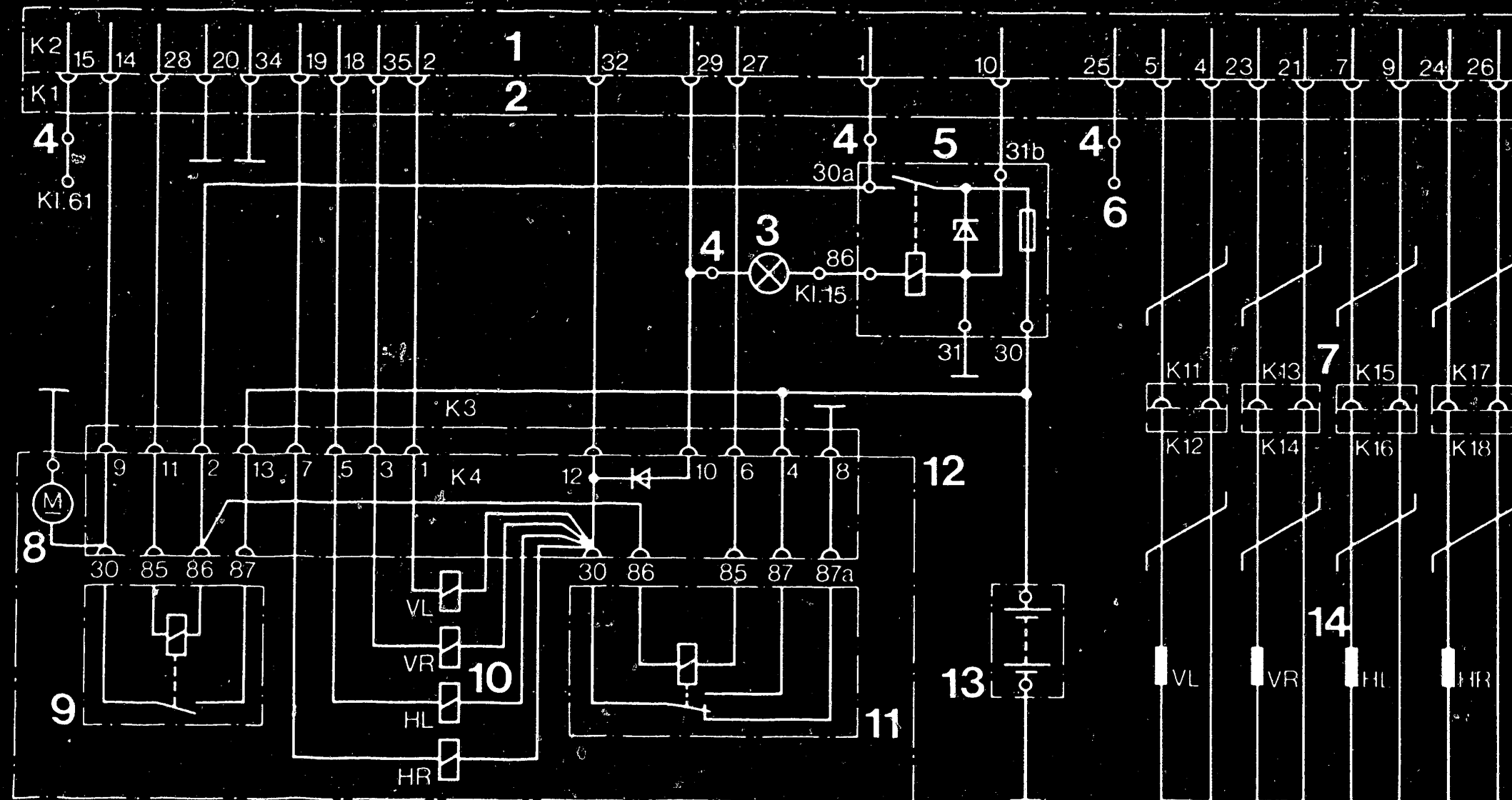
Rapid diagnosis chart
Lancia Thema



C 17

Rapid diagnosis chart
Lancia Thema





265/0208

- 1 = Electronic control unit
- 2 = Multiple plug (35-pin)
- 3 = ABS warning lamp
- 4 = 4-pin plug near control unit
- 5 = Overvoltage protection relay
- 6 = To stop-lamp switch (+)
- 7 = Cable connector

- 8 = Return-pump motor
- 9 = Motor relay
- 10 = Solenoid-op. valves
- 11 = Valve relay
- 12 = Hydraulic modulator
- 13 = Battery
- 14 = Wheel-speed sensor

- VL = FL = front left
- VR = FR = front right
- HA = RA = rear axle
- HL = RL = rear left
- HR = RR = rear right
- K1 to K18 = ABS plug connectors

5. ELECTRICAL TERMINAL DIAGRAM

C18

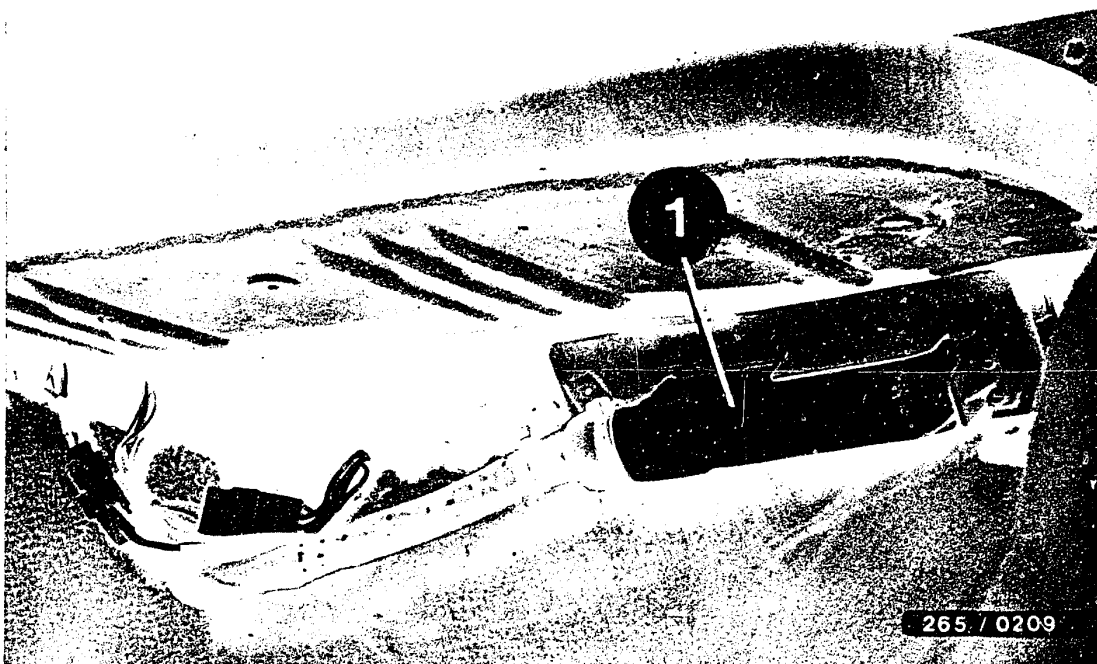
Electrical terminal diagram
Lancia Thema



C19

Electrical terminal diagram
Lancia Thema





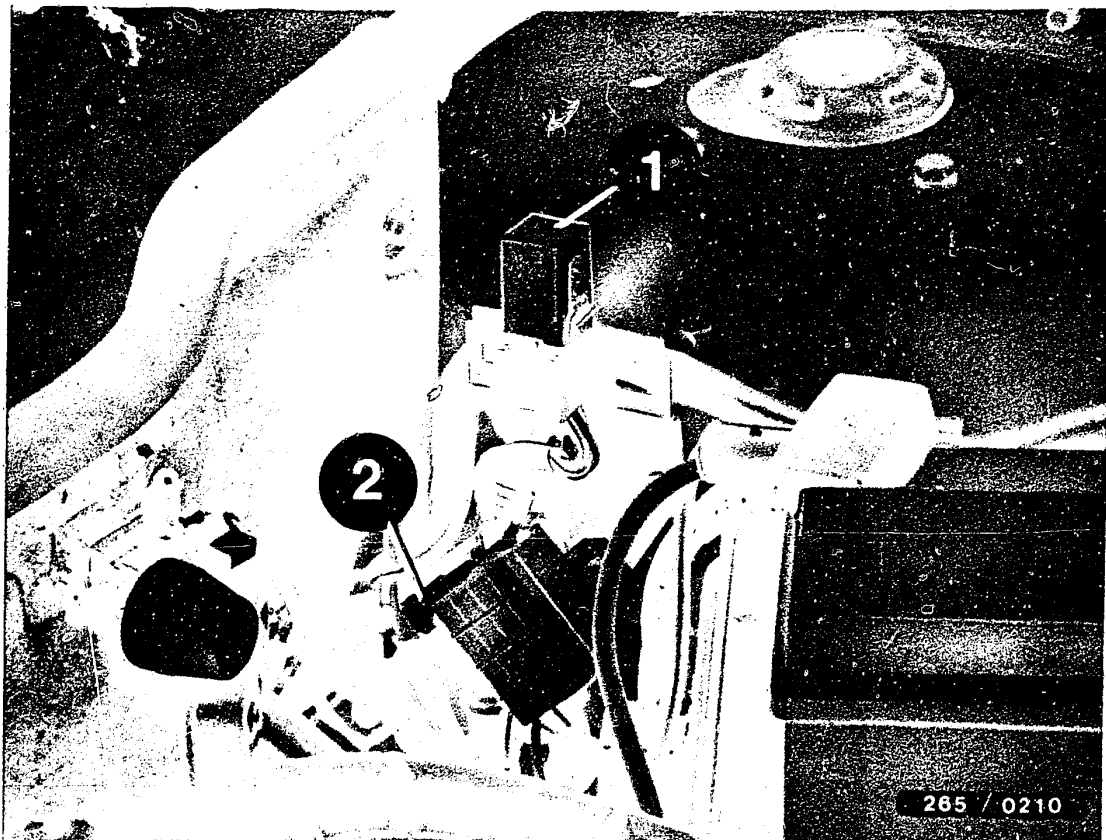
1 = ABS control unit

6. INSTALLATION POSITION OF COMPONENTS

The indications "right" and "left" apply always as viewed in the forward direction of travel.

- Control unit: Below glove shelf.
- Hydraulic modulator: In engine compartment, front left, in front of battery.
- Ground terminal: On battery B -
- ABS warning lamp: In instrument panel.





- 1 = Overvoltage protection relay
 2 = Wheel-speed sensor plug connector.

● Overvoltage protection relay:

In engine compartment on left, near spring strut.

● Front-axle wheel-speed sensors:

One each on left and right in steering knuckles.

Corresponding plug connectors:

In engine compartment on left, below overvoltage protection relay and on right on spring strut crown.

● Rear-axle wheel-speed sensors:

One each on left and right behind brake disks.

Corresponding plug connectors:

On left and right in luggage-compartment recesses.



7. TEST EQUIPMENT AND TOOLS

Description	Designation	Part No.
<u>ABS tester</u> Use only converted tester. Identification "U2" on nameplate or as of FD 352	ETT 016.00	0 684 101 600
<u>Brake analyzer</u>	e.g. BPS 100 or BPS 101 or BPS 104 or BPS 105	0 680 012 .. 0 680 013 .. 0 680 018 .. 0 680 019 ..
<u>Filling and discharging device</u>		e.g. ATE Part No. 3.9302-1000.4 ¹⁾
<u>Bleeder fitting</u> For connection of filling and discharging device to master cylinder fluid reservoir		ATE Part No. 3.9302.0702.2 ¹⁾
<u>Bleeder hose</u>		ATE Part No. 3.3590.2300.1 ¹⁾
<u>Auxiliary hose</u>		ATE Part No. 3.9302.0704.2 ¹⁾
Brake-pedal actuating device		ATE Part No. 3.9312.0100.4 ¹⁾

1) = obtainable from Alfred Teves GmbH, Guerickestraße 7
600 Frankfurt (Main)



Description	Designation	Part No.
Pressure tester Tester for low- and high-pressure testing of hydraulic brake systems		e.g. ATE Part No. 3.9305-0200.4 1)
Double-end box wrench open 9 x 11 mm		Hazet Part No. 612 2)
Vessel for collecting the brake fluid approx. 1 l		
Brake fluid	Dutela* DOT 4	
Electrics tester or Multimeter for trouble- shooting	ETE 014.00	0 684 101 400 commercially available

1) = obtainable from: Alfred Teves GmbH
Guerickestr. 7
6000 Frankfurt (Main)

2) Firma Hazet
5630 Remscheid



7.1 Additional equipment

Use only Lancia genuine brake lines.

<u>Description</u>	<u>Part No.</u>
Grease for wheel-speed sensors	Molykote- Longterm 2
Protective caps for brake lines	Bosch Part No. 1 900 508 002 (100 pieces)
Protective caps for brake line connections on hydraulic modulator	1 900 508 004 (100 pieces)



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BOSCH system : Motronic
Make of vehicle : FORD
Basic microcard : PKW-015

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Self-diagnosis/Rapid diagnosis chart.....	3
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Hydraulic-lines diagram.....	
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Tests without coordinate details are not applicable in these trouble-shooting instructions.



SPECIAL FEATURES

Microcard with trouble-shooting instructions for the engine control system (EEC IV) from Ford (characteristic-map ignition and gasoline injection as with Motronic), valid at the time of publication, for the following Ford models:

- Ford Sierra 2.0i with cat. converter (10.85→)
- Ford Scorpio 2.0i with cat. converter (10.85→)

New functions:

- Lambda closed-loop control
- Exhaust-gas afterburning (Pulsair)
- Expanded self-test diagnosis with fault memory. Special tester required.
- Adjustment control (consideration of disturbances e.g. leakage air or wear, that is, ageing of components).

If the battery is disconnected, both the adjustment data (adaptive memory) and the trouble data are lost. Afterwards, the system needs a certain period of time to re-collect the information lost. For this reason, the vehicle may have poor driveability during the first 10 km or so after the interruption of the supply voltage.

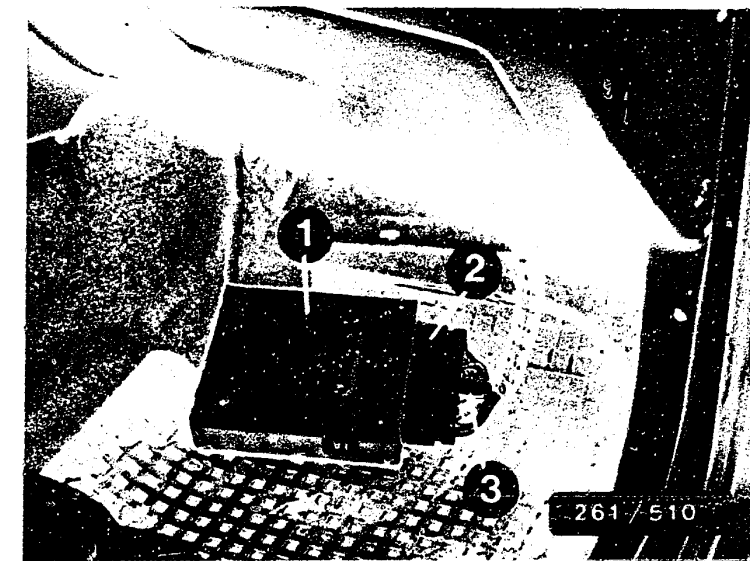
Important note:

If reference is made to a basic microcard, always make sure you use the test specifications from the vehicle-specific brief instructions.



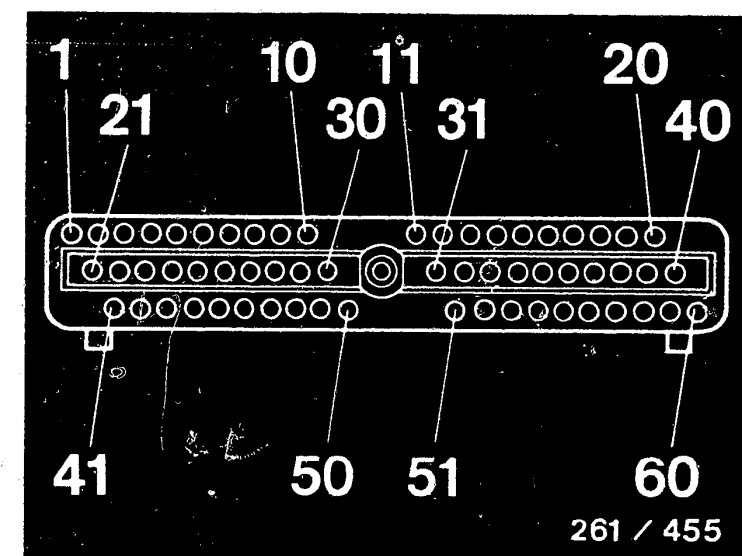
RAPID DIAGNOSIS CHART

Test step	Measuring range	Components and/or respective cables tested. Remarks.	Control-unit plug between term.	Test specifications (reading)
1	Ω	Switch off ignition and unscrew control-unit plug. (Upper illustration). Measure resistance at open-ended plug (lower illustration).	20 and vehicle ground	smaller than 1 Ω
2	Ω	Negative supply, control unit	40/60 and battery (-)	each smaller than 0.5 Ω
3	M Ω	Disconnect plug for octane/idle correction (if connected). Measure resistance at control-unit plug. Yellow cable (3), idle correction. Red (23) and blue (24) cable for spark-advance correction	3 and ground	greater than 1 M Ω
			23 and ground	
			24 and ground	
4	Ω	Position switch and lead for automatic: For manually-shifted transmission:	30 and 40	Item P, N : $\infty \Omega$ Item D : smaller than 20 Ω $\infty \Omega$
5	k Ω	Engine temperature sensor and relative cables	7 and 46	Engine cold: 20...100 k Ω Eng., norm. op. temp: 2...10 k Ω
6	Ω	Air-flow sensor	27 and 46 26 and 27	50...100 Ω 480...600 Ω
7	k Ω	Intake-air temperature sensor	25 and 46	1.45...3.3 k Ω
8	Ω	Throttle-valve potentiometer	47 and 46 47 and 26	600...750 Ω 950...1200 Ω
9	Ω	Idle actuator	37 and 21	8...16 Ω . If test specification below tolerance, reverse polarity of instrument lead.



- 1 = EEC IV control unit
- 2 = Control-unit plug (6-pin)
- 3 = Fastening screw for control-unit plug

60-pin EEC IV control-unit plug
(View of terminals)



D3

Rapid diag. chart to univ. test adapter
Ford Sierra, Scorpio



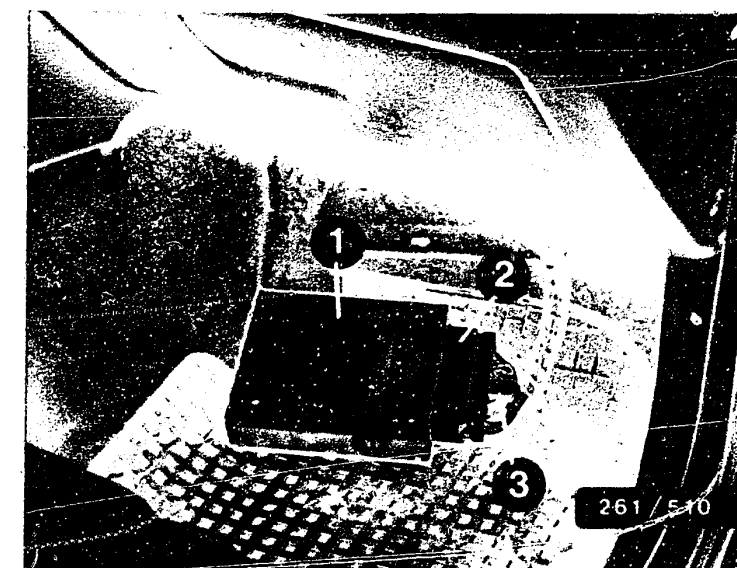
D4

Rapid diag. chart to univ. test adapter
Ford Sierra, Scorpio



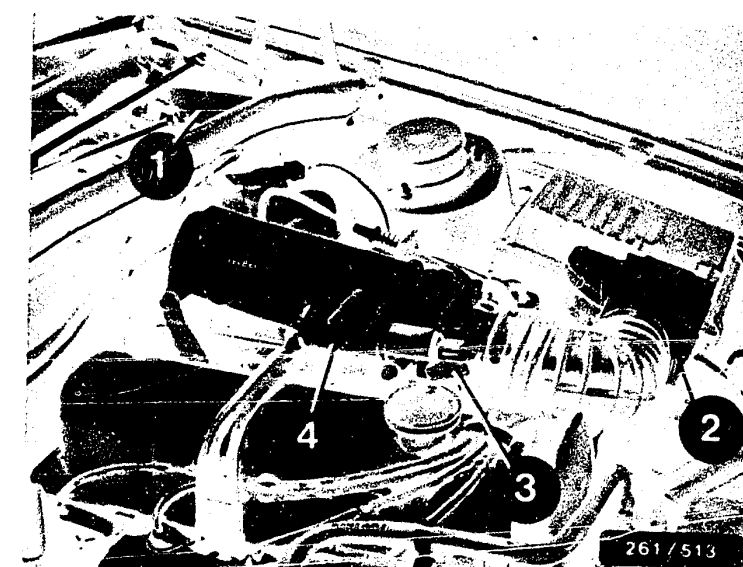
Rapid diagnosis chart (continued)

Test step	Measuring range	Components and/or relevant cables tested. Remarks.	Control-unit plug between term.	Test specifications (reading)
10	Ω	Injection valves: Cyl. 1 and 2 (parallel)	37 and 58	7 ... 11 Ω
11	Ω	Injection valves: Cyl. 3 and 4 (parallel)	37 and 59	7 ... 11 Ω
12	Ω	Pump relay (winding)	37 and 22	50 ... 120 Ω
13	Ω	Cables: voltage supply, control unit	37 and 57	smaller than 1 Ω
14	Ω	Secondary-air solenoid-operated valve	51 and 37	60 ... 80 Ω
15	Ω	Ground-connection ignition module	16 and 40	smaller than 1 Ω
Reconnect control-unit plug. Switch on ignition. Measure voltage at rear at plug.				
16	V	Main relay. Voltage supply for control unit	37 and ground	10 ... 14 V
17	V	Voltage supply, air-flow sensor, throttle-valve potentiometer and intake-manifold pressure sensor	26 and 46	greater than 4.5 V
18	V	Slowly deflect air-flow sensor flap tap up to stop:	27 and 46	0.2 ... 0.3V Voltage increases up to at least 4.2V
19	V	Throttle-valve potentiometer tap. Slowly accelerate.	47 and 46	approx. 0.6...0.7V Voltage increases up to approx. 4.5V
20	V	Voltage supply for idle actuator.	21 and ground	10 ... 14 V



- 1 = EEC IV control unit
- 2 = Control-unit plug (60-pin)
- 3 = Fastening screw for control-unit plug

- 1 = Fuse and relay box
- 2 = Air-flow sensor
- 3 = Throttle-valve potentiometer
- 4 = Idle actuator



D5

Rapid diag. chart to univ. test adapter
Ford Sierra, Scorpio



D6

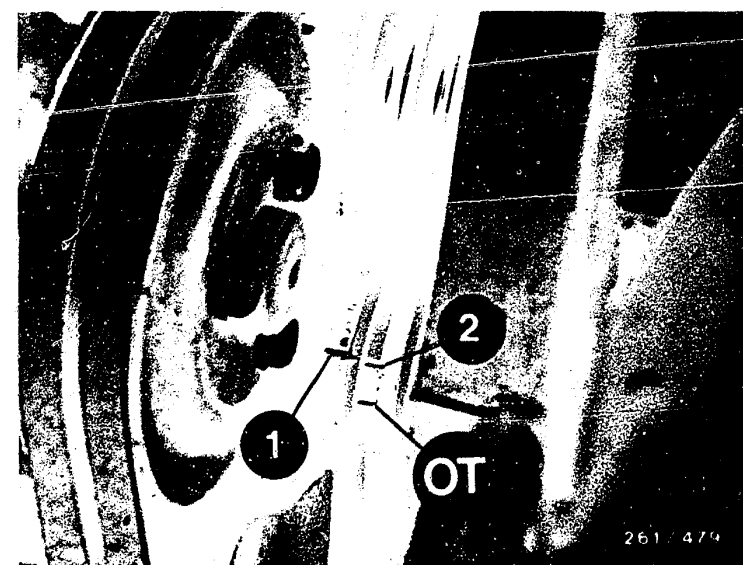
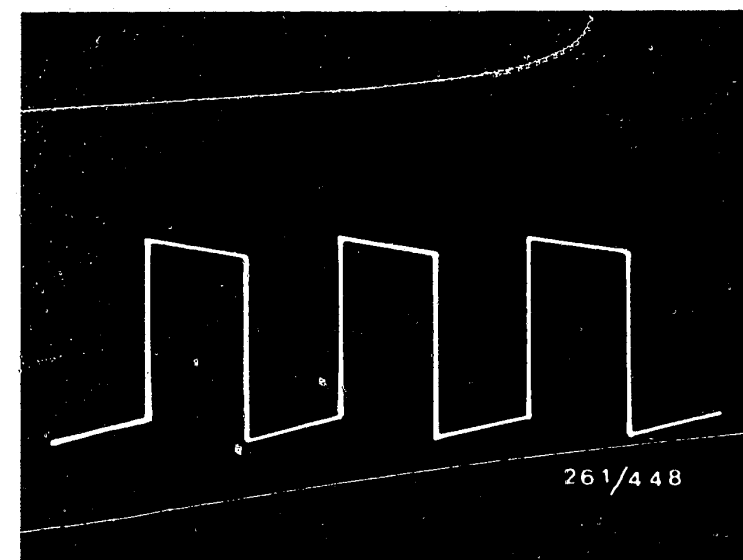
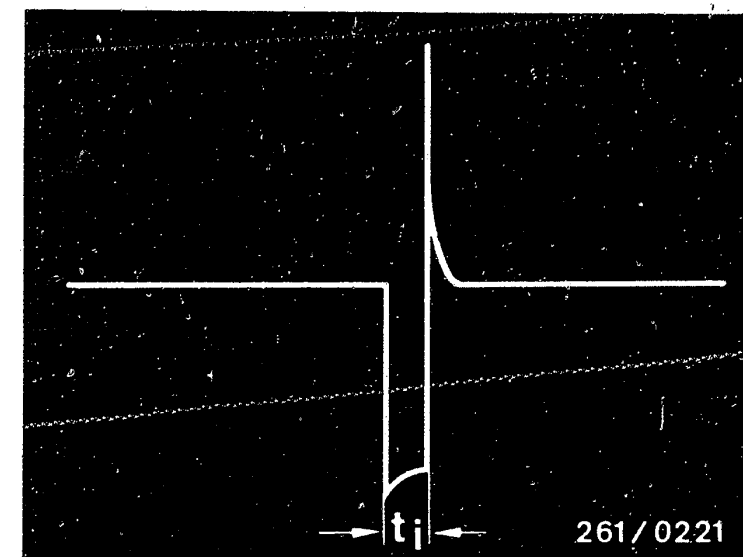
Rapid diag. chart to univ. test adapter
Ford Sierra, Scorpio



Rapid diagnosis chart (continued)

Test step	Measuring range	Components and/or relevant cables tested. Remarks.	Control-unit plug between term.	Test specifications (reading)
21	V	Fuel-pump relay and control unit (pump control)	22 and ground	10...14 V with engine running: max. 4 V
22	V	Air-conditioner coupling (if present)	10 and ground	approx. 0 V Switch off air conditioner: 10...14 V
23	V	Voltage supply for adapter memory (continuous positive)	1 and 20	10...14 V also when ignition switched off
24	Oscilloscope, special input	Control unit: Injection signal for cylinders 1 and 2. Start engine.	58* and ground	see upper illustration
25	Oscilloscope, special input	Control unit: Injection signal for cylinders 3 and 4. Start engine.	59* and ground	
26	Oscilloscope, special input	Intake-manifold vacuum sensor. (At idle, frequency becomes greater -> vacuum).	45 and 26	Rectangular signal (similar to center illustration).
27	Oscilloscope, special input	Hall generator, ignition module: control unit: Start engine.	56 and 37 36 and 37	See center illustration
28	Timing strobe	Spark advance at idle. Engine at normal operating temperature and consuming devices switched off.	---	18° before TDC (see lower illustration)
29	Oscilloscope, special input	Knock sensor (Tap near to sensor with light-weight hammer).	9 and 50	Check voltage peaks after each tap with hammer at oscilloscope.

* Alternatively test directly at the injection valve using test lead 1 684 463 093.



D7

Rapid diag. chart to univ. test adapter
Ford Sierra, Scorpio



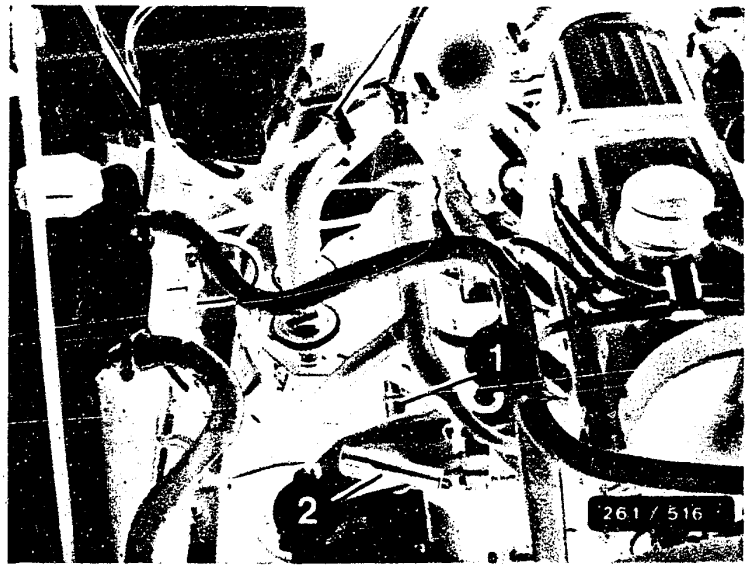
D8

Rapid diag. chart to univ. test adapter
Ford Sierra, Scorpio



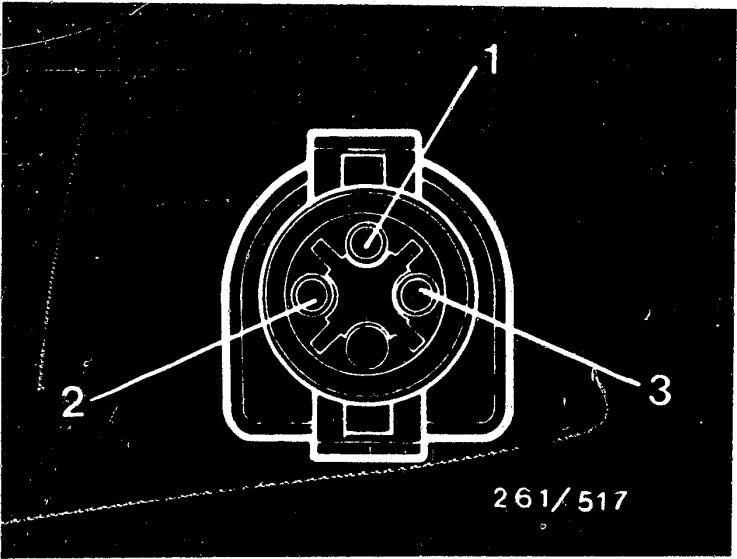
Rapid diagnosis chart (continued)

Test step	Measuring range	Components and/or relevant cables tested. Remarks:	Control-unit plug between term.	Test specifications (reading)
30	Vol. %CO	Upper limit, lambda closed-loop control (control unit). To do this, disconnect plug connection from lambda sensor (see illustrations) and connect socket 1 of connection piece at control unit (lower illustration) to vehicle ground. Continue rapidly taking catalytic converter into account.	---	Co value increases
31	Vol. %CO	Lower limit, lambda closed-loop control (control unit). As above, however, connect socket 1 to approx. +2 V voltage (e.g. use 1.5 V mono-cell; positive to socket 1 and negative to vehicle ground).	---	CO value drops (not measurable at exhaust tailpipe). Feature: engine "hunts".
32	Vol. %CO	Lambda sensor in control mode. Reconnect plug connection of lambda sensor.	---	approx. at 0% by vol. CO (engine and catalytic converter at normal operating temperature)
		Disconnect air hose at fuel pressure regulator and seal.		CO briefly rises and drops again to approx. 0% by vol.



1 = Lambda sensor
2 = Plug connection of lambda sensor

Plug connections of lambda sensor; connection to control unit (top view)
1 = lambda input (term. 29)
2+3= Voltage supply for heater winding



TEST SPECIFICATIONS

The test specifications given are valid for measurements taken directly at the components. When measuring resistances, disconnect plug to component.

- Idle speed
Manually-shifted gearbox: 900 min⁻¹
Automatic (position N,P): 900 min⁻¹
- Spark advance at idle
(Basic setting): 18° before TDC
- CO content at idle
(Engine and catalytic converter at normal operating temperature): 0% by vol. CO
- Fuel pressure: 2.3 ... 2.7 bar
- Electric fuel pump
Fuel delivery (measured in return): at least 750 cm³/30s

at connection voltage (under load): at least 12 V
- Solenoid-operated injection valve
Internal electrical resistance at +15°C ... +30°C: 15 ... 17.5 Ω
- Ignition coil
Primary resistance: 0.68...0.91 Ω
Secondary resistance: 4.30...7.30 kΩ
- Air-flow sensor and temperature sensor
Internal electrical resistance
Term. 9 to term. 6: 500...1100 Ω
Term. 7 to term. 6: 8...2500 Ω
(Deflect air-flow sensor flap from off-position to full-load stop)
Term. 22 to term. 6 (NTC 1)
at +15°C...+30°C: 1.45...3.3 kΩ



Test specifications (continued)

Engine temperature sensor

Internal electrical resistance with

cold engine (+15...+30°C):

20 ... 100 kΩ

warm engine (approx. +80°C)

2 ... 10 kΩ

● Throttle-valve potentiometer

Internal electrical resistance

term. 26 (orange) to term. 46

(black):

3.2 ... 4.8 kΩ

Term. 47 (green) to term. 46 (black)

Throttle valve closed:

600 ... 750 Ω

Throttle valve open:

3.5 ... 4.0 kΩ

● Idle actuator

Internal electrical resistance:

9 ... 14 Ω

● Secondary-air solenoid-operated valve

Internal electrical resistance:

60 ... 80 Ω

● Intake-manifold pressure sensor

Internal electrical resistance

Term. 45 to term. 26:

800 ... 900 Ω

Term. 45 to term. 46:

1.3 ... 1.4 kΩ

● Knock sensor

Internal electrical resistance:

greater than
1 MΩ

Tightening torque:

15 ... 25 Nm

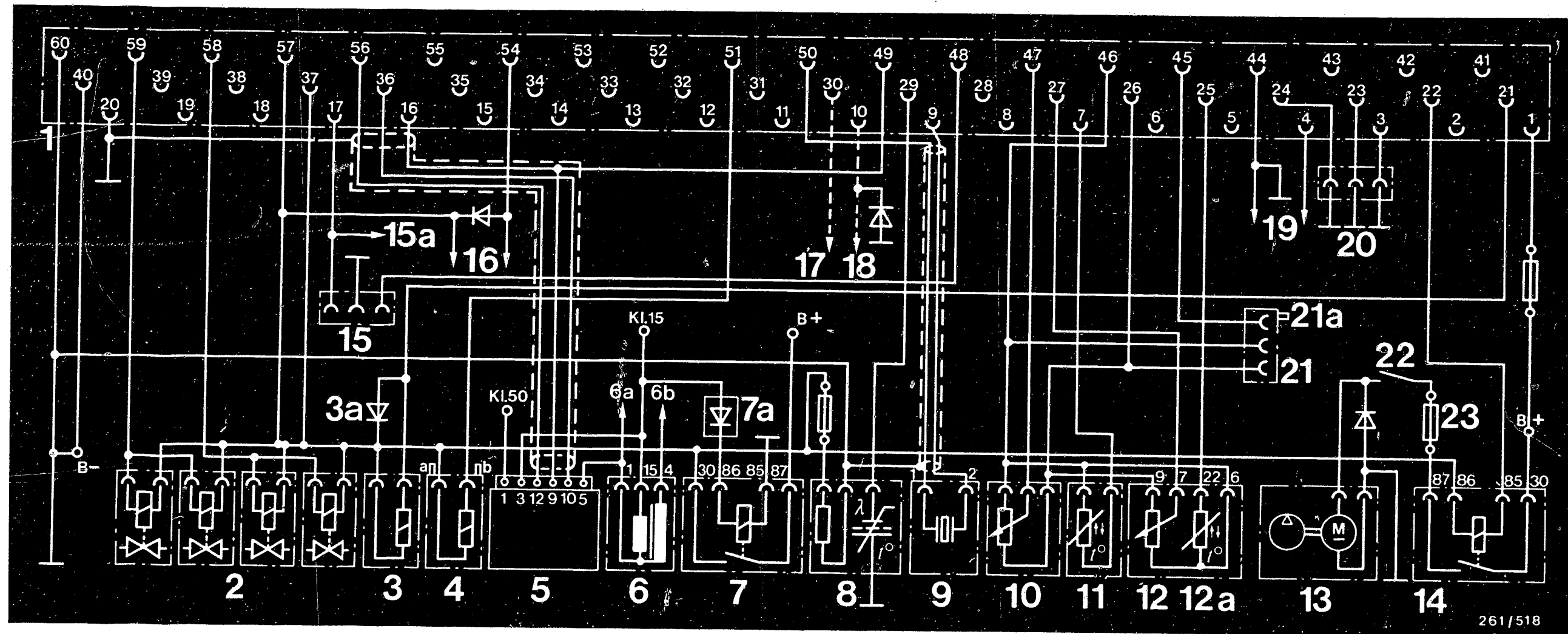
● Lambda sensor

Internal electrical resistance

of heater winding:

1 ... 15 Ω





ELECTRICAL TERMINAL DIAGRAM (vehicles with catalytic converter and Pulsair system)

1 = EEC IV control unit
 2 = Solenoid-operated injection valves
 3 = Idle actuator
 3a = Cutoff diode
 4 = Secondary-air solenoid-operated valve with 2 air connections
 a = Connection, intake manifold
 b = Connection, vacuum-controlled secondary-air valve
 5 = Ignition module (TFI IV)
 6 = Ignition coil
 6a = to tachometer

6b = to high-voltage distributor
 7 = Main relay
 7a = Reversed-polarity protection diode
 8 = Lambda sensor
 9 = Knock sensor
 10 = Throttle-valve potentiometer
 11 = Temperature sensor (coolant)
 12 = Air-flow sensor
 12a = Temperature sensor (air)
 13 = Fuel pump
 14 = Pump relay
 15 = Self-diagnosis connection
 15a = Connection, fuel computer

16 = Air-conditioner relay actuator (if present)
 17 = Position switch (N/D switch; if automatic)
 18 = To magnet coupling, air conditioner (if present)
 19 = to speed sensor
 20 = Plug for octane/idle correction
 21 = Intake-manifold pressure sensor
 21a = Connection, intake manifold
 22 = Safety switch
 23 = Pump fuse (No. 30)

D13

Electrical terminal diagram
 Ford Sierra, Scorpio



D14

Electrical terminal diagram
 Ford Sierra, Scorpio



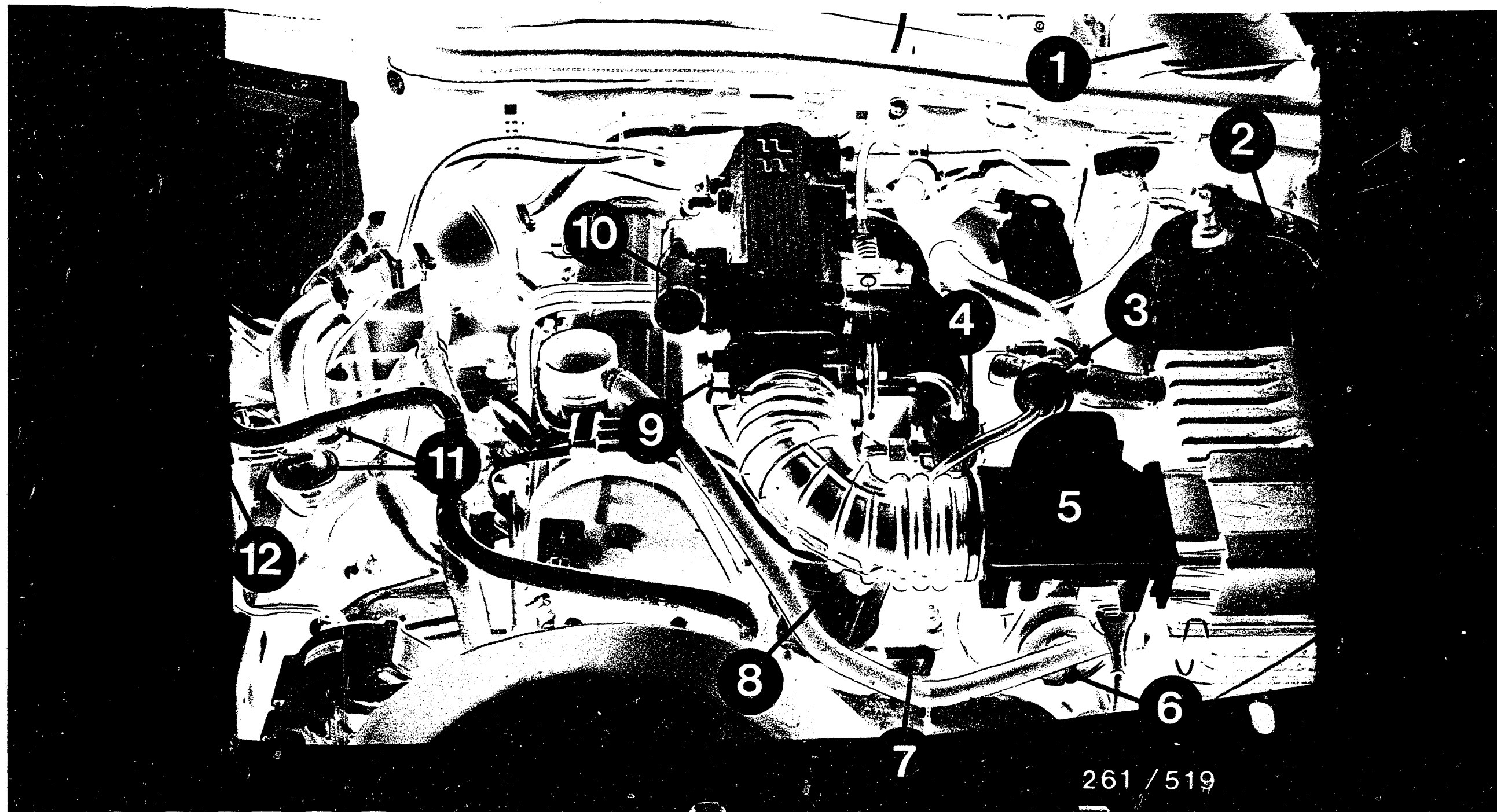
TEST EQUIPMENT AND TOOLS

<u>Description</u>	<u>Designation</u>	<u>Part No.</u>
Motortester	e.g. MOT 201 or MOT 300 and MOT 400	0 684 000 201 0 684 000 300 0 684 000 400
Calibrated infrared exhaust- gas analyzer	e.g. ETT 008.04 or ETT 008.05	0 684 100 804 0 684 100 805
Multimeter (internal resistance at least 20 k Ω /V)		Commercially available, e.g. Metrawatt GmbH, Type MA2H or Fluke Multimeter 75 or 77
Pressure gauge 6 bar or Pressure tester or Pressure tester (no longer available) Three-way line as connection piece for KDJE-P 100 and KDEP 1034	Quality class 1.0 0.1 bar graduations	1 687 231 154 KDJE-P 100 KDEP 1034 KDJE-P 100/16



<u>Description</u>	<u>Part No.</u>
Feeler gauge for measuring the sensor air gap (up to 1mm)	Commercially available
Electric connection cable (test lead) for direct connection of the components under test, e.g. resistor of the solenoid-operated injection valves	KDJE 7450/70
Chassis dynamometer e.g. LPS 96 or LPS 002	0 680 017 001 0 680 100 200
Test lead 2-pin, for measuring resistances and signals, e.g. at injection valves	1 684 463 093
Test leads for expert connection of testers to component plugs	KDZS 0004 (2.8 mm wide) KDZS 0005 (6.3 mm wide)





INSTALLATION POSITION OF COMPONENTS (Illustration: Sierra)

- 1 = Central fuse box
- 2 = Ignition coil
- 3 = Vacuum-controlled secondary air valve
- 4 = Fuel-pressure regulator

- 5 = Air-flow sensor
- 6 = Fuel filter
- 7 = Ignition module (TFI IV)
- 8 = Ignition distributor

- 9 = Throttle-valve potentiometer
- 10 = Idle actuator
- 11 = Secondary-air non-return valve
- 12 = Secondary-air solenoid-operated valve

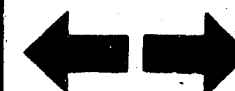
D17

Installation position of components
Ford Sierra, Scorpio



D18

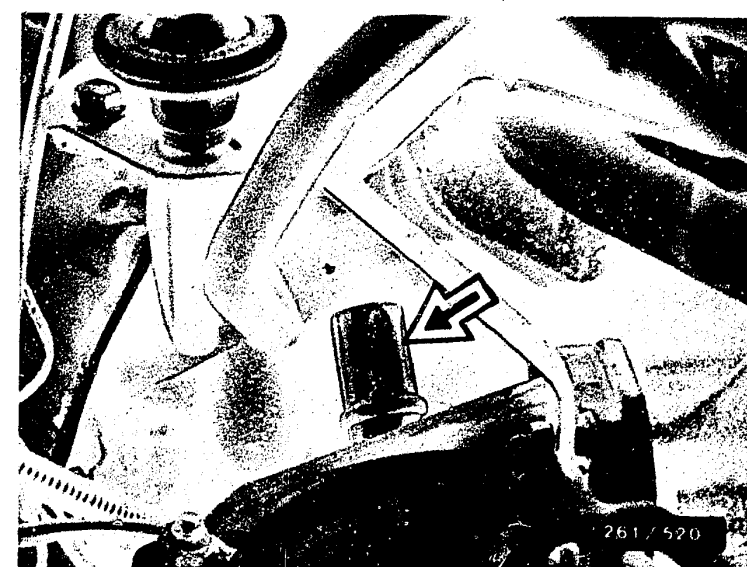
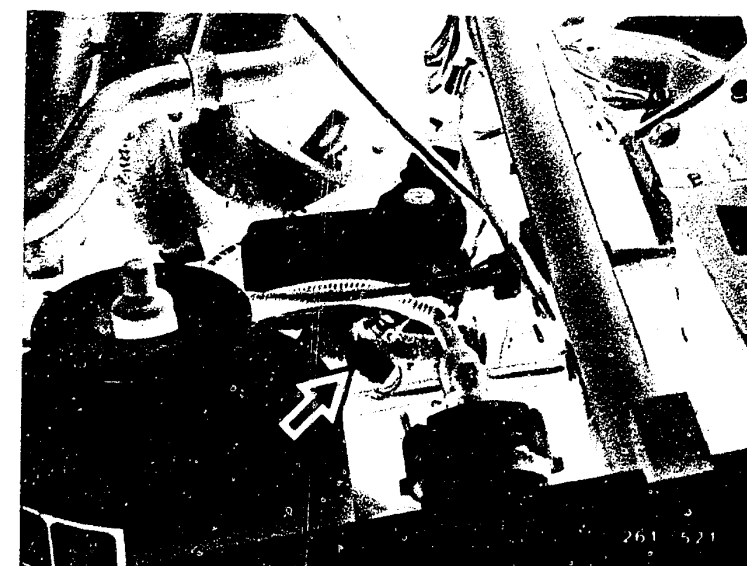
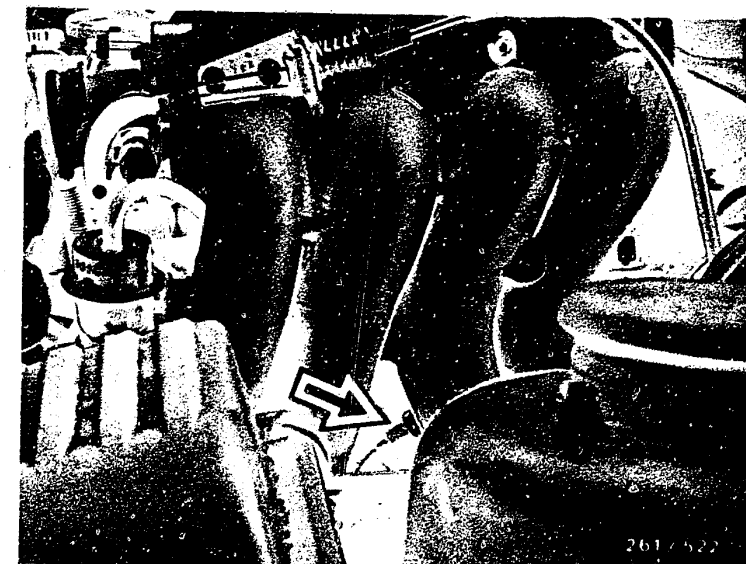
Installation position of components
Ford Sierra, Scorpio



Installation position of components (continued)

The indications "right" and "left" always refer to the forward direction of travel.

- EEC IV control unit:
In footwell on passenger's side, beneath instrument panel
- Engine temperature sensor:
Screwed into engine block below the intake manifold (upper illustration)
- Knock sensor:
Beneath the intake-manifold pipes at cylinder block.
- Fuel filter:
Under the vehicle at left, near to fuel tank or in engine compartment, at left at bottom of firewall.
- Ground terminal, control unit (term. 20):
On the body near the control unit (remove cover beneath instrument panel on passenger's side).
- Plug for octane/idle correction (red cap, if plug open)
Near ignition coil (central illustration - arrow, → Sierra)
- Lambda sensor:
Screwed into exhaust pipe (lower illustration)



D19

Installation position of components
Ford Sierra, Scorpio



D20

Installation position of components
Ford Sierra, Scorpio



Installation position of components (continued)

● Main relay, pump relay and pump fuse

a) Scorpio

Behind instrument panel (upper illustration: 1 = Pump relay
2 = Main relay)

(First remove instrument screen with fastening screws, then upper safety covering with fastening screws and retaining clamps).

Pump fuse in glove compartment.

b) Sierra

In footwell passenger's side, beneath instrument panel, near to control unit (center illustration - arrows).

(If necessary, disconnect control unit withdrawing downwards and disconnect relay from the metal holder).

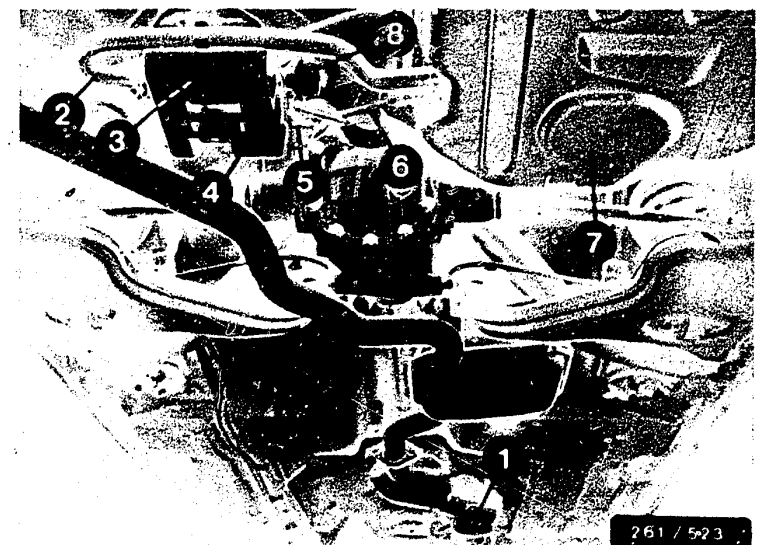
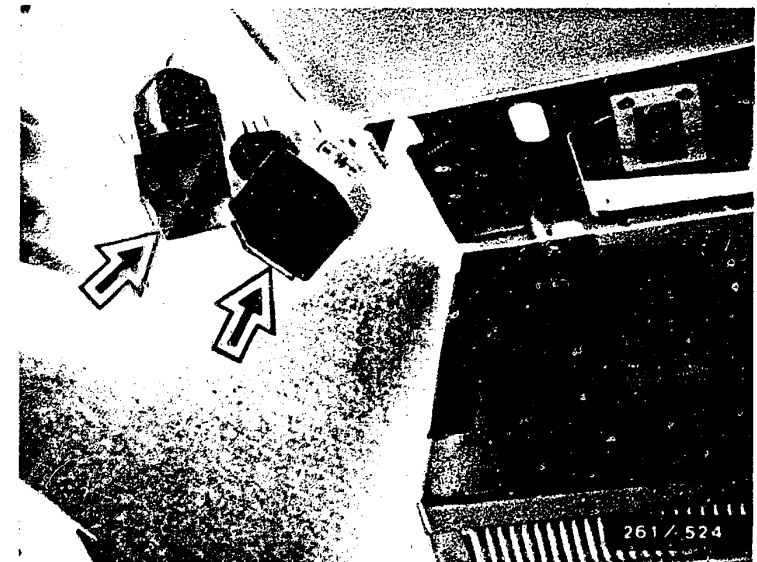
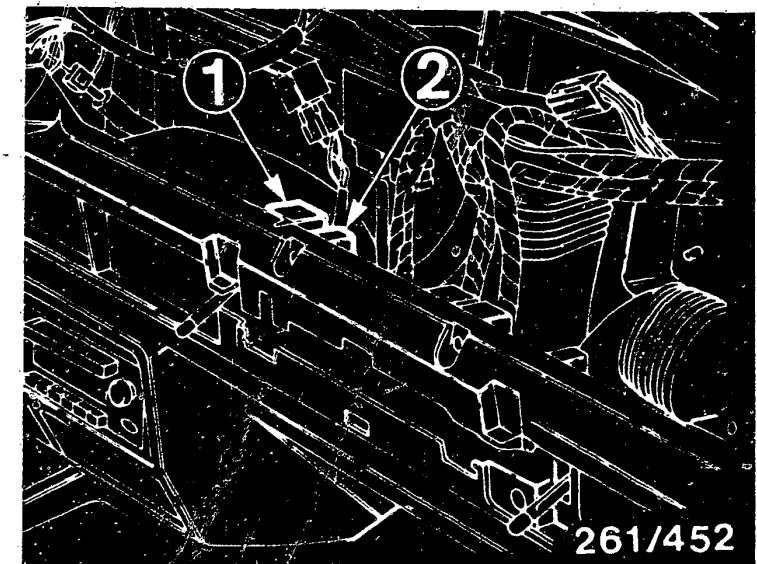
● Catalytic converter

In the central section of the exhaust system (lower illustration, Item 1)

● Fuel pump

Under the vehicle, near fuel tank (lower illustration, Item 3)

- 1 = Catalytic converter
- 2 = Suction line
- 3 = Fuel pump (beneath cover)
- 4 = Protective cover
- 5 = Fuel-injection tubing
- 6 = Return line
- 7 = Fuel tank
- 8 = Pressure damper



D21

Installation position of components
Ford Sierra, Scorpio



D22

Installation position of components
Ford Sierra, Scorpio



GENERAL IMPORTANT INFORMATION

Always following instructions, in order to avoid damage to the engine, control unit or ignition coil, as well as to prevent danger to persons.

1. Never start engine when battery not firmly connected.

2. Incorrect polarity of the supply voltage, e.g. through incorrect connection of the battery or ignition coil, may lead to the destruction of the control unit.

3. Never use a fast charger for starting the engine. Provide starting aid only using a second 12 V battery and jump leads.

Caution! Due to non-uniform demands of the vehicle manufacturer made on electronic products, we recommend that a 24 V battery never be used for providing starting aid. Observe the vehicle owner's manual.

4. Disconnect the battery from the vehicle electrical system before boost charging.

5. When charging the battery in the vehicle or providing starting aid, observe the instructions in the operating manual of the fast charger, as well as the instructions from the vehicle manufacturer.

6. Never disconnect the battery from the vehicle electrical system when the engine is running.

7. Never short circuit ignition coil term. 1 to ground (e.g. for switching off the engine). Ignition coil and, under certain circumstances, control unit are destroyed.

8. Never connect the positive battery terminal to ignition coil term. 1. Control unit is destroyed.



9. Never disconnect or connect wiring-harness plug of control unit when ignition is switched on.

10. When temperatures are above + 80°C (drying oven), the control unit must be removed.

11. When welding (electric spot welding), the control unit must be removed.

12. When testing the compression, the Motronic relay must be disconnected. In this way, undesired injection by the injection valves is avoided.

13. When installing an alarm system, observe the installation instructions for Motronic vehicles or the SIS microcard ALL-500.

Make sure that the alarm relay is not destroyed by external fields (e.g. from ignition cables) so that it responds in a defective manner.

14.

Caution!

**High-energy ignition system.
Dangerous primary
and secondary voltages.**



Contact with components or terminals under voltage may be dangerous (both at the primary and secondary ends).



TABLE OF CONTENTS

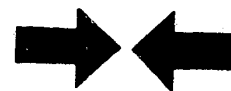
Trouble-shooting instructions: FOR-5000

BOSCH system : KE-Jetronic

Make of vehicle : Ford

Basic microcard : MB-501

<u>Section</u>	<u>Coordinates</u>
Special features	2
Test specifications	3
Self-diagnosis/Rapid diagnosis chart	9
Electrical terminal diagram	16
Air/fuel-line diagram	19
Important general information	21
Installation position of components	22



1. Special features:

The KE-Jetronic, system version KE 2, in the Ford Escort RS 1600 T (as of model year 1986) corresponds to the basic version (without lambda closed-loop control) in its construction and operation. See description in Technical Instruction 1 987 722 021.

Functional range of the electrically-controlled correction functions:

- Warm-up enrichment
- Starting enrichment
- Post-start enrichment
- Acceleration enrichment
- Full-load enrichment
- Overrun cutoff
- Engine-speed limiting

Special features of engine:

- Exhaust turbo-supercharger

Basic microcard for detailed trouble-shooting: MB 501.

Important information:

When referring to a basic microcard, note that the test specifications should always be taken from the vehicle-specific brief instructions.



2. Test specifications

Test step

Test specifications*

2.1 Electric fuel pump:

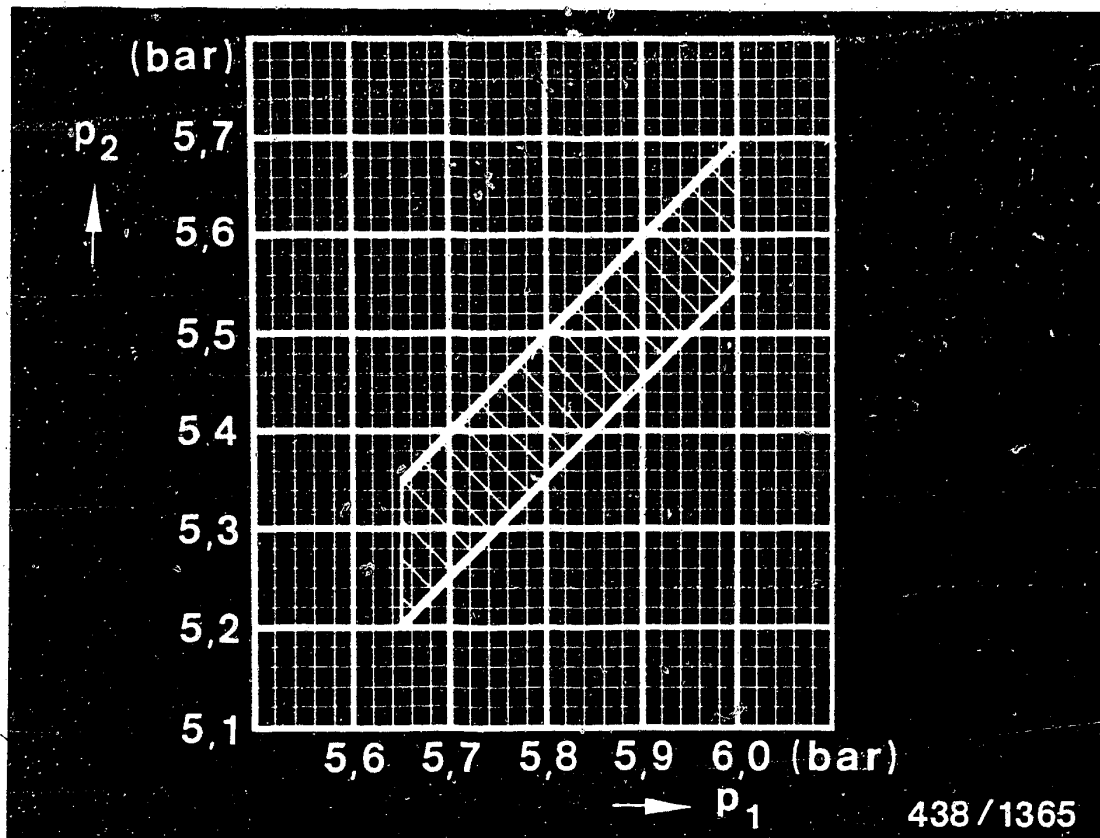
Fuel delivery: min. 1100 cm³/min.

2.2 Fuel pressures:

Primary pressure: 5,65 ... 6,0 bar
(5,75 ... 6,1 kp/cm²)

* Pressures in the test-specification table are given in bar (gauge pressure) and in kgf/cm² (gauge pressure)





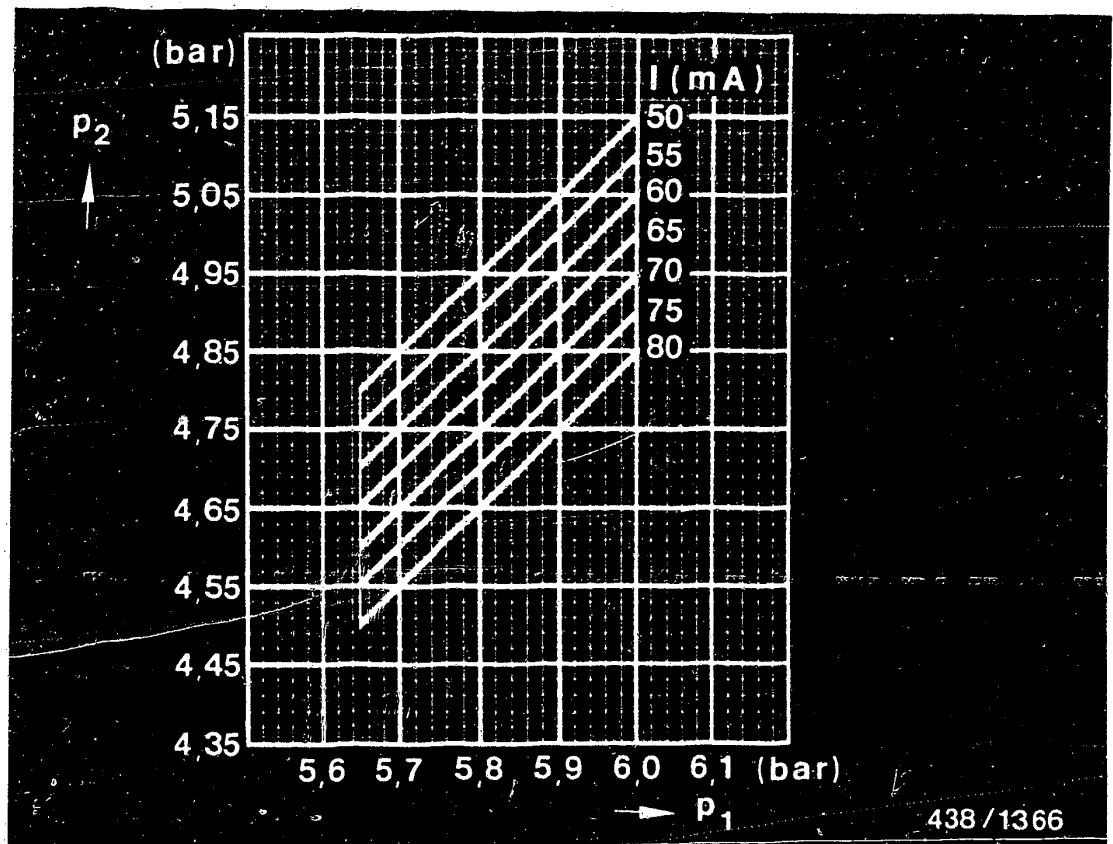
p_1 = Primary pressure

p_2 = Lower-chamber pressure, controller current = 0 mA

Differential pressure:

(Primary pressure/lower-chamber pressure)

Take the "warm" lower-chamber set-value pressure from the graph in accordance with the measured primary pressure. The "warm" state is simulated by removing the plug from the pressure controller (controller current 0 mA).



438 / 1366

p_1 = Primary pressure

p_2 = Lower-chamber pressure "cold". Tolerance ± 0.15 bar

I = Controller current

Take the "cold" lower-chamber set-value pressure from the graph in accordance with the measured primary pressure and the measured controller current. The "cold" state is simulated by removing the plug from the temperature sensor (NTC). Connect the plug to the pressure controller.

Test stepTest specifications*2.3 Leak test on overall fuel system:

Minimum pressure after 10 min:	2.7 bar (2.8 kgf/cm ²)
after 20 min:	2.6 bar (2.7 kgf/cm ²)

2.4 Injection valve:

Opening pressure:	3.0...4.1 bar (3.1...4.2 kgf/cm ²)
-------------------	---

2.5 Fuel distributor test:

(Test with pressure controller mounted.
Pressure controller deenergized).

Comparative measure- ment of deliveries from outlets:	Setting point	Max. allowable delivery
Idle:	6.0 cm ³ /min	6.6 cm ³ /min
Part load:	40.0 cm ³ /min	42.5 cm ³ /min
Full load:	155,0 cm ³ /min	169,0 cm ³ /min
At least the full-load delivery of the setting point must be reached at every outlet at maximum sensor-plate deflection.		

Flow-through quantity of the KE throttling restriction in the fuel distributor:	130 ... 145 cm ³ /min.
---	-----------------------------------

* Pressures in the test-specification table are given
in bar (gauge pressure) and in kgf/cm² (gauge
pressure).



Test stepTest specifications2.6 Temperature sensorResistance measurements:

Engine cold. Ambient
temperature

(+15°C...+30°C):

1300...3600Ω

Engine at normal operating
temperature

(approx. +80°C):

250...390Ω

2.7 Thermo-time switchResistance measurements:

Resistance measurements between

At temperature	Term. "G" and ground (housing)	Term. "W" and ground (housing)	Term. "G" and term. "W"
below +30°C	25 ...40 Ω	0 Ω	25...40 Ω
above +40°C	50 ...80 Ω	100... 160 Ω	50...80 Ω

2.8 Air-flow sensor potentiometer:

Voltage signal with
air-flow sensor plate
in basic position:

0.2...0.3 V

2.9 Auxiliary-air device:

Resistance of heating
coil:

30...65Ω



Test stepTest specifications2.10 Idle-speed adjustment:

Carry out inspection and adjustment of idle speed with engine at normal operating temperature and fan running – if necessary, pull cable plug connection at radiator temperature switch and bridge.

Idle speed: 900 ... 950 min⁻¹

Idle exhaust conc. (CO): 0.25...0.75 vol. %



3. Rapid diagnosis chart for universal test adapter
ETT 018.01 with KE-Jetronic test lead 1 684 463 135 and
suitable multimeter:

The following rapid diagnosis chart makes it possible for the experienced Jetronic expert to quickly check the electrical/electronic functions of the KE-Jetronic peripherals and control unit.

Important note on the following rapid diagnosis chart:

The "Test conditions" column shows for which test steps the control-unit plug must be connected or disconnected.

Always ensure that the ignition is off whenever connecting or disconnecting.

The "test connections" column provides information on the leads connected in the appropriate measurement path, with reference to the pin assignment in the control-unit plug. Any required trouble-shooting refers to these leads.



Rapid diagnosis chart for universal test adapter ETT 018.01

Test step	Switch position		Button	Object under test	Test connections	Test conditions	Test specifications (Reading)
	V	Ω					
1	↓	4	-	Pressure controller internal resistance	12-10	Disconnect control unit plug	21...30 Ω
2	↓	5	-	Temperature sensor internal resistance +15...+30°C approx. +80°C	21-2	Control-unit plug disconnected.	1,3...3,6k Ω 250...390 Ω
3	↓	9	-	Throttle-valve switch "idle"	13-2	Note: Ohmmeter connection: Left blue jack " Ω ", black jack "V". Control-unit plug disconnected. Switch on ignition. Throttle valve closed: Open throttle valve by hand:	0 ... 10 Ω ∞ Ω
4	↓	10	-	Throttle-valve switch "full load"	5-2	Note: Ohmmeter connection: Left blue jack " Ω ", black jack "V". Control-unit plug disconnected. Switch on ignition. Throttle valve closed: Open throttle valve by hand:	∞ Ω 0 ... 10 Ω
5	4	-	-	Starting signal	24-2	Control-unit plug disconnected. Operate starting motor.	8 ... 15 V
6	5	-	-	TD signal	25-2	Control-unit plug disconnected. Operate starting motor for a few seconds.	U undef.
7	6	-	-	Control unit supply	1-2	Control-unit plug disconnected. Switch on ignition.	8 ... 15 V
8	7	-	-	Air-flow sensor potentiometer supply	18-2	Switch off ignition. Connect control unit. Switch on ignition.	7.0...8.0 V

E10

Rapid diag. chart for univ. test adapter
Ford Escort RS 1600 T, 5.86 →



E11

Rapid diag. chart for univ. test adapter
Ford Escort RS 1600 T, 5.86 →



Rapid diagnosis chart for universal test adapter ETT 018.01 (continued)

Test step	Switch position		But-ton	Subject of testing	Test connections	Test conditions	Test specifications (reading)
	V	Ω					
9	8	-	-	Potentiometer signal from air-flow sensor	17 - 2	Control unit connected. Switch on ignition. Deflect sensor plate by hand. Voltage rise from 0 to max. 8.0 V	0 ... 8.0 V
10	-	-	1	Warm-up enrichment - 20°C	12 - 12	Control unit connected. Switch on ignition.	30 ... 50 mA
11	-	-	2	Actuator current, corresponding to engine at operating temperature	12 - 12	Control unit connected. Switch on ignition.	0 ... 1 mA
12	-	-	2/4	Starting enrichment	12 - 12	Control unit connected. Switch on ignition. Hold button 2 depressed. Triggering of starting enrichment (temperature-independent) at beginning of starting (TA 4). Regulation time approx. 1 second.	110 ... 130 mA
13	-	-	1/4	Post-start enrichment	12 - 12	Control unit connected. Switch on ignition. Hold button 1 depressed. Triggering of post-start enrichment (temperature-dependent) at end of starting (TA 4). Then slow regulation to warm-up value in test step 11. (30 ... 50 mA)	140 ... 160 mA

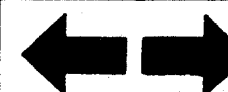
E12

Rapid diag. chart for univ. test adapter
Ford Escort RS 1600 T, 5.86 →



E13

Rapid diag. chart for univ. test adapter
Ford Escort RS 1600 T, 5.86 →



Rapid diagnosis chart for universal test adapter ETT 018.01 (continued)

Test step	Switch position		But-ton	Subject of testing	Test connections	Test conditions	Test specifications (reading)
	V	Ω					
14	-	-	1/6	Acceleration enrichment	12 - 12	Control unit connected. Switch on ignition. Keep both buttons depressed. Current corresponding to test specification in test step 11 (30 ... 50mA). Then deflect sensor plate. Current rises to test specification and regulates back down again very quickly (approx. 1 second).	62 ... 102 mA
15	-	-	6	Full-load enrichment	12 - 12	Control unit connected. Disconnect plug at throttle-valve switch and bridge connections 18 and 3 (center and top). Run engine (operating temperature) at approx. 4500 min ⁻¹ . Current:	15 ... 19 mA
16	-	-	2	Cutoff	12 - 12	Control unit connected. Start engine. Reverse polarity of ammeter (switch + and -). Increase engine speed during operation of buttons to approx. 2000 min ⁻¹ . Then close throttle valve. Current reading goes to test specification and switches at approx. 1500 min ⁻¹ to 0 ... 1 mA.	> - 40 mA
17	-	-	-	Engine-speed limiting	12 - 12	Operation by reversing polarity as for overrun cutoff. Cutoff speed:	6200... 6400 min ⁻¹

E14

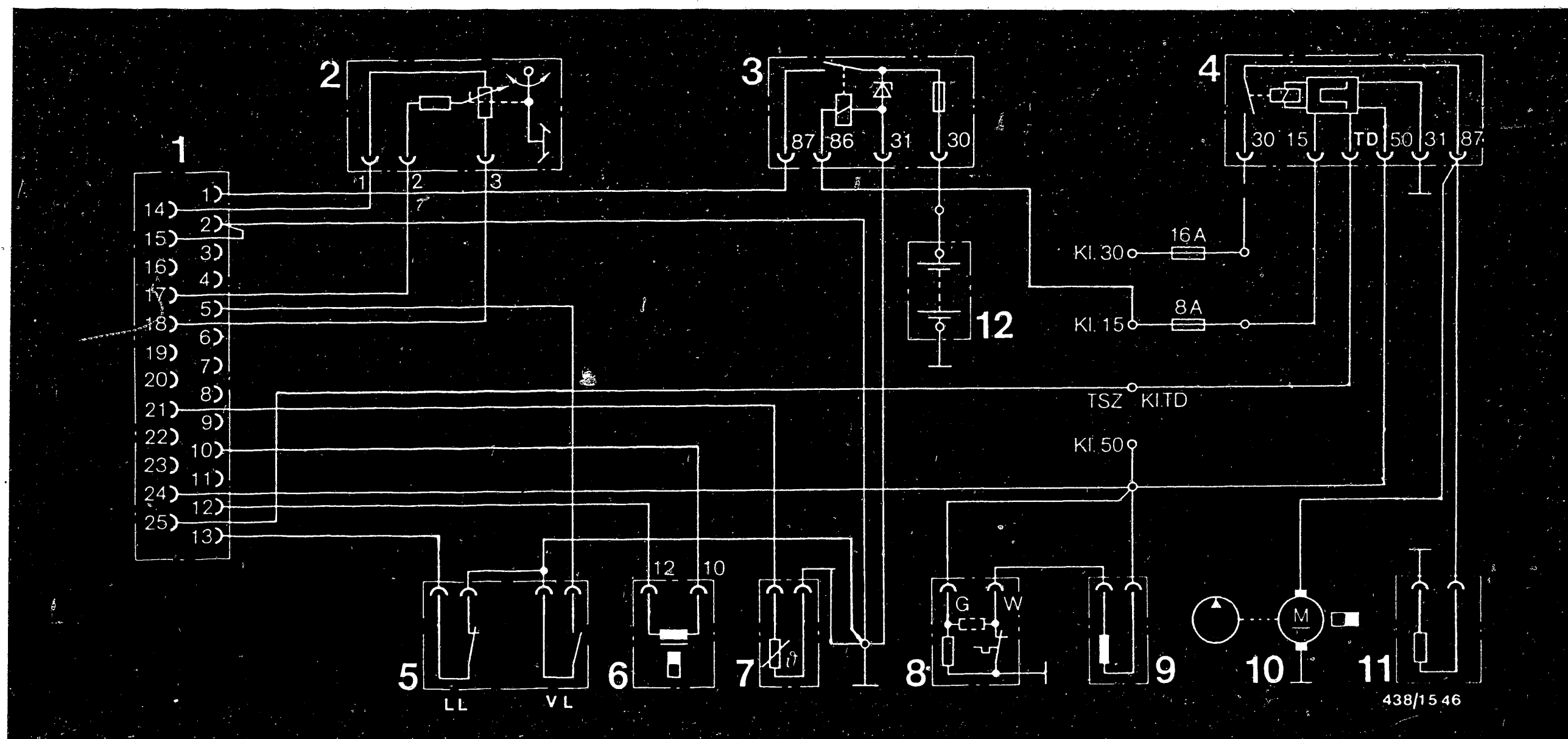
Rapid diag. chart for univ. test adapter
Ford Escort RS 1600 T, 5.86 →



E15

Rapid diag. chart for univ. test adapter
Ford Escort RS 1600 T, 5.86 →





4. Electrical safety circuit

4.1 Electrical terminal diagram of KE-Jetronic

- 1 = Electronic control unit
- 2 = Air-flow sensor potentiometer
- 3 = Electronic relay with overvoltage protection
- 4 = Engine-speed relay for safety circuit (pump relay)

- 5 = Throttle-valve switch
Idle, full load
- 6 = Electrohydraulic pressure controller
- 7 = Temperature sensor (NTC)
- 8 = Thermo-time switch

- 9 = Start valve
- 10 = Electric fuel pump
- 11 = Auxiliary-air device
- 12 = Battery

E16

Electrical terminal diagram

Ford Escort RS 1600 T, 5.86 →

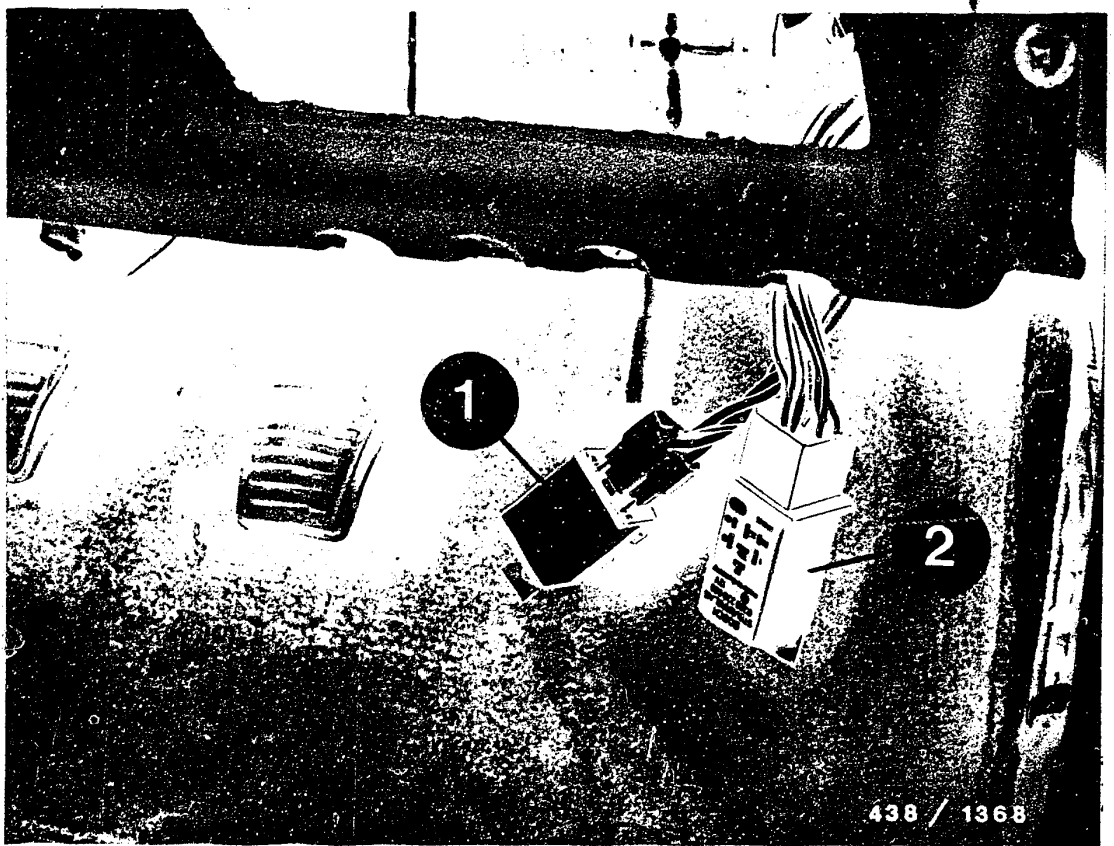


E17

Electrical terminal diagram

Ford Escort RS 1600 T, 5.86 →





- 1 = Electronic relay with over-voltage protection
 2 = Engine-speed relay (pump relay)

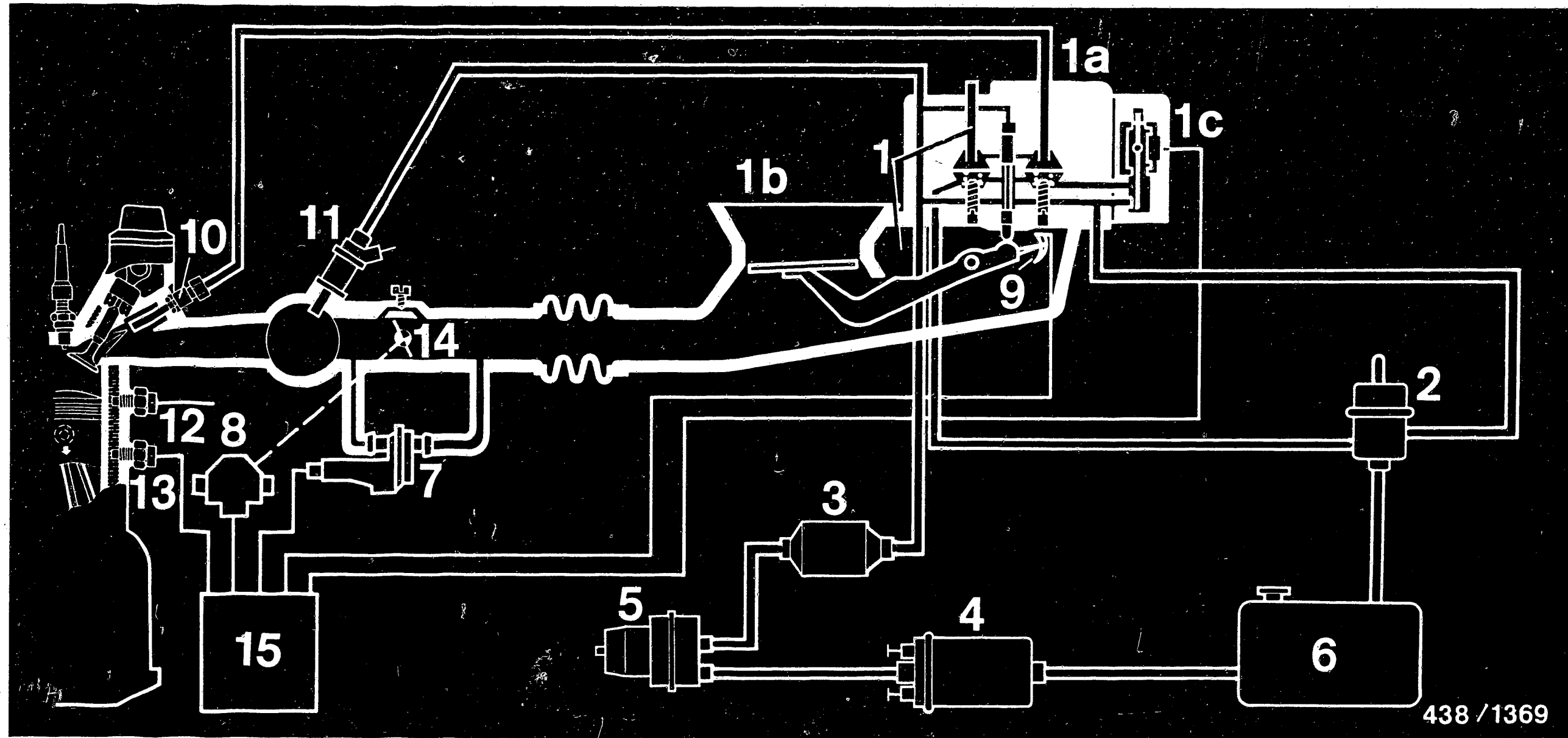
4.2 Bridging of electrical safety circuit:

Bridging (for all pressure and injected-quantity measurements) is performed at the frame of the engine-speed relay.

As regards vehicles manufactured in the first months of production, the engine-speed relay and over-voltage protection relay are located beneath the instrument panel on the driver's side (picture taken in an RHD vehicle).

In newer vehicles both relays are located in the central-electrics console (engine compartment, engine-speed relay marked "KE").





5. Diagram of fuel lines in KE-Jetronic

- 1 = Mixture-control unit
- 1a = Fuel distributor
- 1b = Air-flow sensor
- 1c = Electrohydraulic pressure controller
- 2 = Pressure regulator (primary pressure)
- 3 = Fuel filter

- 4 = Electric fuel pump
- 5 = Fuel accumulator
- 6 = Fuel tank
- 7 = Auxiliary-air device
- 8 = Throttle-valve switch - full load/idle

- 9 = Air-flow sensor potentiometer
- 10 = Injection valve
- 11 = Start valve
- 12 = Thermo-time switch
- 13 = Temperature sensor (NTC)
- 14 = Throttle valve
- 15 = Control unit

E19

Diagram of fuel lines

Ford Escort RS 1600 T, 5.86 →



E20

Diagram of fuel lines

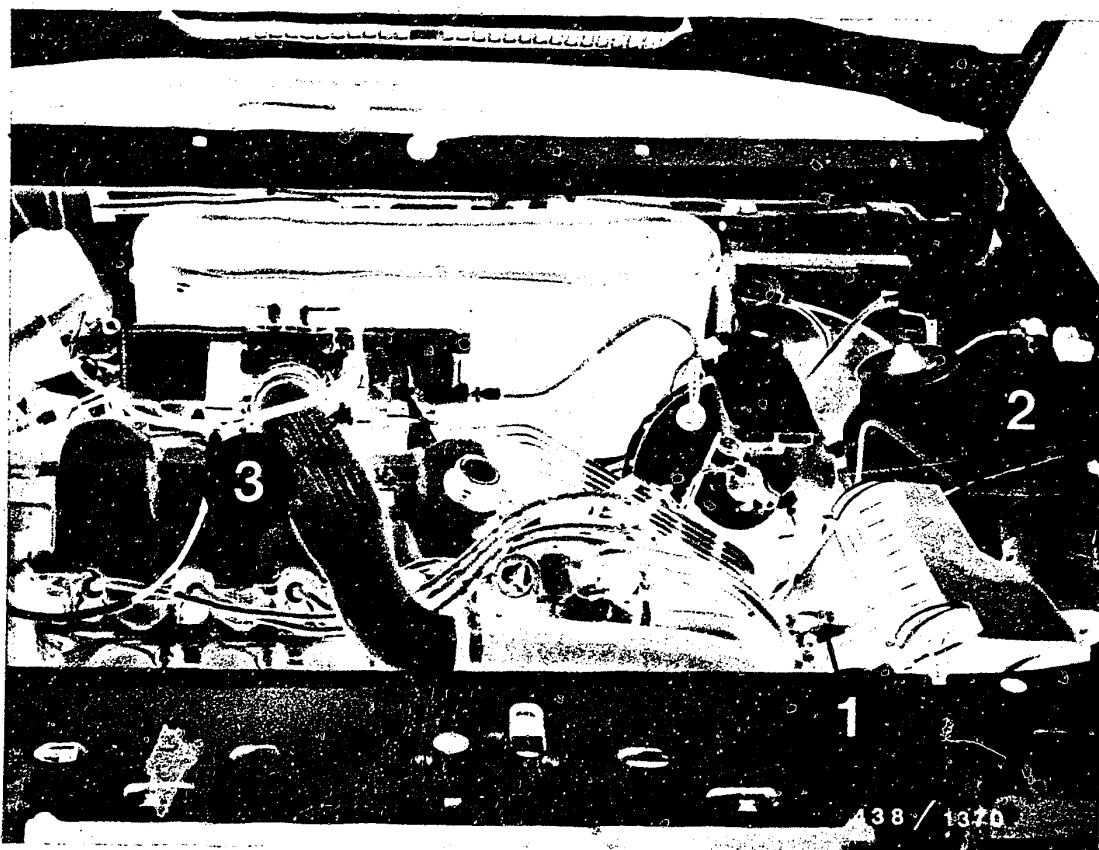
Ford Escort RS 1600 T, 5.86 →



6. General safety information for working on vehicles with KE-Jetronic

- During testing when the electric fuel pump is running, never deflect the sensor plate of the air-flow sensor (by pressing down), since this would cause fuel to be injected by the fuel-injection valves. This can lead to extremely serious engine damage if the engine is subsequently started.
- Observe test-medium specifications when testing the fuel-injection valves with a valve tester. Never carry out testing with normal gasoline or other highly inflammable fluids. When using calibrating fluid, observe local safety regulations.
- Test the engine induction system for leakage only with a leak-detector spray authorized for that purpose (e.g. Gypoflex). Do not use easily inflammable fluids. Observe local safety regulations.
- Never start engine without battery firmly connected.
- Never disconnect the battery from the vehicle electrical system with the engine running.
- Disconnect the battery from the vehicle electrical system before quick charging.
- Remove the KE-Jetronic control unit before exposure to temperatures above +80°C (paint-drying installation).
- Remove the KE-Jetronic control unit before electrical welding work (e.g. spot welding).
- Make sure all wiring-harness plugs are correctly seated.
- Never disconnect or connect the control-unit wiring-harness plug with the ignition switched on.





7. Installation position of individual components

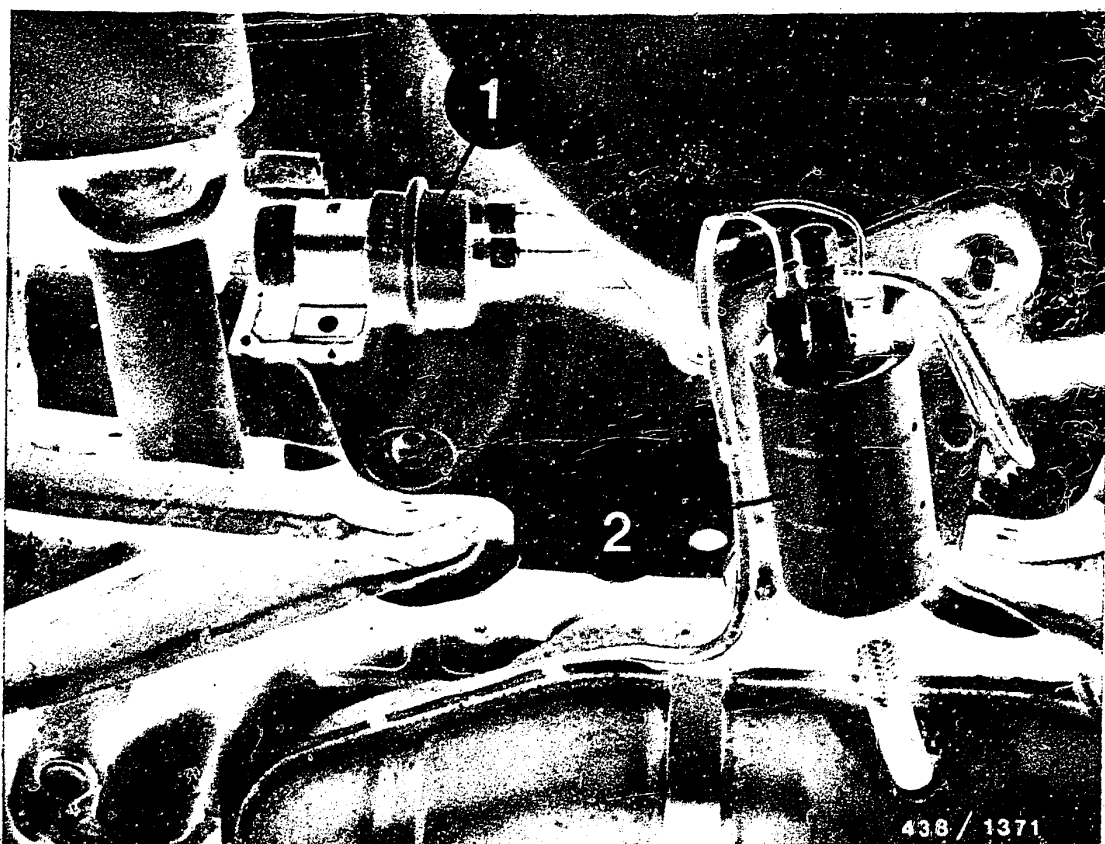
7.1 Arrangement of components in engine area:

- 1 - Mixture-control unit and primary-pressure regulator underneath air-filter housing.
- 2 - Fuel filter on left inside fender, behind air filter.
- 3 - Throttle-valve switch at venturi assembly.
Fuel-injection valves in flanges of intake tubes.

Auxiliary-air device on intake manifold.
Thermo-time switch and temperature sensor (NTC) below intake-manifold flanges 2 and 3 (accessible from underside of vehicle).

Control unit on engine firewall behind heater housing.





- 1 = Fuel accumulator
- 2 = Electric fuel pump

7.2 Fuel-supply components:

The electric fuel pump and fuel accumulator are located on the underside of the vehicle in the area above the rear axle.



TABLE OF CONTENTS

Trouble-shooting instructions: FIA-506

BOSCH system : L-Jetronic

Make of vehicle : FIAT

Basic microcard : FIA-01/J22

<u>Section</u>	<u>Coordinate</u>
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SPECIAL FEATURES

This microcard contains the L-Jetronic trouble-shooting instructions, valid at the time of printing, for the following Fiat and Lancia models with 1,499l, 4 cyl. engine:

Regata 75 i.e.)

Strada 75 i.e.)

Uno 75 i.e.)

FRG 3.1985 →

X1/9 Iniezione Coupé

USA 9.1983 →

Lancia Prisma 1500 i.e

FRG 3.1985 →

- L-Jetronic with 35-pin control unit 0 280 000 223, is controlled by term. 1 of the ignition coil. 7-pin air-flow sensor and 13-pin relay set.
- Pressure sensor for altitude compensation.
- Lambda sensor for lambda closed-loop control and three-way catalytic converter.

Comment:

The L-Jetronic in the Fiat 1.5l, 4 cylinder corresponds for the most part to that in the Fiat 2.0l, 4 cylinder.

- Similar SIS repair instructions:
SIS microcard FIA-01/J22.

Important note:

The test specifications must always be taken from this microcard.

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

- Universal Test Adapter 0 684 101 801 and
- Adapter Lead 1 684 463 129

The following rapid diagnosis chart enables the experienced L-Jetronic specialist to rapidly check the electric portion of the system with the universal test adapter.

The rapid diagnosis chart contains the following information:

- Test step sequence
- Position of V- and Ω -program switches
- Notes on the operation of the universal test adapter or other components.
- Test values for engine tester and multimeter



Rapid Diagnosis Chart for Universal Test Adapter

Testing L-Jetronic with Adapter Lead 1 684 463 129

Test Step	Switch Position		Measurement	Control Unit Plug between Terminals	Note	Test Value (Reading)
	V	Ω				
1	3	-	Voltage from ignition and starting switch term. 50.	4 and 5	Shift gear to neutral, start.	<u>8 ... 15 V</u>
2	4	-	Voltage from relay set term. 88c via the auxiliary-air device.	34 and 5	Shift gear to neutral, start.	<u>8 ... 15 V</u>
3	5	-	Voltage pulses from ignition coil term. 1	1 and 5	Shift gear to neutral, start	Ignition pulses on the oscilloscope, primary signal.
4	6	-	Voltage from relay set term. 88a.	10 and 5	Ignition "ON".	<u>8 ... 15 V</u>
5	7	-	Voltage from 1st solenoid-operated injection valve term. 15	15 and 5	Ignition "ON".	<u>8 ... 15 V</u>
6	8	-	Voltage from 2nd solenoid-operated injection valve term. 33	33 and 5	Ignition "ON".	<u>8 ... 15 V</u>
7	9	-	Voltage from 3rd solenoid-operated injection valve term. 32	32 and 5	Ignition "ON".	<u>8 ... 15 V</u>
8	10	-	Voltage from 4th solenoid-operated injection valve term. 14	14 and 5	Ignition "ON".	<u>8 ... 15 V</u>
9	11	-	Voltage via pump contact in the air-flow sensor from relay set term. 86b.	20 and 5	Ignition "ON". Deflect air-flow sensor flap.	<u>8 ... 15 V</u>

F3

Rapid diag. chart for univ. test adapter
Fiat



F4

Rapid diag. chart for univ. test adapter
Fiat



Rapid diagnosis chart for universal test adapter

Testing the L-Jetronic with adapter lead 1 684 463 129 (continued).

Test step	Switch position		Measurement	Control-unit plug between terminals	Remarks	Test specifications (reading)
	V	Ω				
10	12	-	Voltage from relay set term. 88b.	29 and 5	Ignition "on".	<u>8 ... 15 V</u>
11	↓	6	Resistance value of potentiometer, wiper in air-flow sensor term. 7.	7 and 5	Deflect air-flow sensor flap as far as it will go.	<u>80 ... 600 Ω</u>
12	↓	7	Resistance value of potentiometer, total resistance in air-flow sensor term. 8.	8 and 5	---	<u>260 ... 520 Ω</u>
13	↓	8	Series-resistor value and total potentiometer resistance in the air-flow sensor term. 9:	9 and 5	Disconnect 3-pin lead plug from pressure sensor (altitude sensor).	<u>400 ... 800 Ω</u>
14	↓	9	Ohmmeter of idle contact in throttle-valve switch term. 2.	2 and 18	Accelerator in off-position:	<u>0 ... 10 Ω</u>
					Slightly depress accelerator:	<u>∞ Ω</u>
15	↓	10	Resistance value of full-load contact in throttle-valve switch term. 3	3 and 18	Accelerator in off-position:	<u>∞ Ω</u>
					Fully depress accelerator (full-load position):	<u>0 ... 10 Ω</u>
16	↓	11	Resistance value of temperature sensor NTC I in air-flow sensor term. 27.	27 and 5	---	at +15°C...+30°C <u>1.45...3.3 kΩ</u> at approx. +80°C: <u>280...360 Ω</u>

F5

Rapid diag. chart for univ. test adapter
Fiat



F6

Rapid diag. chart for univ. test adapter
Fiat



Rapid diagnosis chart for universal test adapter

Testing the L-Jetronic with adapter lead 1 684 463 129 (continued)

Test steps	Switch position		Measurement	Control-unit plug between terminals	Remarks	Test specifications (reading)
	V	Ω				
17	↓	12	Resistance value of temperature sensor NTC II term. 13 (engine temperature).	13 and 5	---	at +15°C...+30°C <u>1.3...3.6 kΩ</u> at approx. +80°C: <u>250...390 Ω</u>
18	↓	13	Resistance value ground output stage term. 16.	16 and 5	---	<u>0 ... 10 Ω</u>
19	↓	14	Resistance value ground output stage term. 17.	17 and 5	---	<u>0 ... 10 Ω</u>
20	↓	8	Resistance value of pressure sensor, total resistance term. 2 and term. 3 of pressure sensor.	9 and 5	Disconnect 7-pin lead plug from air-flow sensor	<u>2.3 ... 2.8 kΩ</u>
21	↓	19	Resistance value of pressure sensor, wiper resistance term. 1 and term. 2 of pressure sensor	12 and 5	Disconnect 7-pin lead plug from air-flow sensor, resistance value is not linear.	at 977 mbar (approx. 300 m altitude) <u>2.0 ... 2.5 kΩ</u> at 616 mbar (approx. 4000 m altitude). <u>2.2 ... 2.7 kΩ</u>

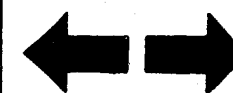
F7

Rapid diag. chart for univ. test adapter
Fiat



F8

Rapid diag. chart for univ. test adapter
Fiat



Rapid Diagnosis Chart for Universal Test Adapter (Continuation)

Note:

The following components with their respective connecting leads are not covered by the universal test adapter during rapid diagnosis:

- | | |
|--|--|
| 1. Solenoid-operated cold-start valve, | Connecting leads 46 and 47 |
| 2. Thermo-time switch, | Connecting leads 45 and ground connection. |
| 3. Electric fuel pump, | Connection lead from relay set term. 88d to electric fuel pump and ground cable. |



TEST VALUES

Pressure Regulator

- Fuel pressure 2.3...2.7 bar

Electric Fuel Pump

- Fuel delivery (measured in return line): at least 650 cm³/30s
- Terminal voltage (under load): at least 12 V

Thermo-Time Switch (35°/8 sec.):

● Electric Internal resistance at	Between term. "G" + ground	Between term. "W" + ground	Between term. "G" + "W"
Ambient temperature (below +30°C)	25...40 Ω	0Ω	25...40 Ω
Engine at normal op. temp. (above +40°C)	50...80 Ω	100...160Ω	50...80 Ω

Solenoid-Operated Cold-Start Valve

- Electric internal resistance 3.5...4.5 Ω
- Leaks: maximum permissible 1 drop/min.

Auxiliary-Air Device

- Electric internal resistance: 40...75 Ω



Test specifications (continued)

Temperature sensors

● Electrical internal resistance	at air-fl.s. between term. 6 and term. 27 NTC I (air)	NTC II (engine)
----------------------------------	--	-----------------

Ambient temperature (+15°C...+30°C):	1.45...3.3 kΩ	1.30...3.6 kΩ
---	---------------	---------------

Eng. at op. temp. (approx. +80°C):	280...360 Ω	250...390 Ω
---------------------------------------	-------------	-------------

Solenoid-operated injection valve (at +20°C)

● Electrical internal resistance:	2.0...3.0 Ω
-----------------------------------	-------------

Air-flow sensor:

● Resistance value between:	
term. 6 and term. 9	400 ... 800 Ω
term. 6 and term. 8	260 ... 520 Ω
term. 6 and term. 7 (fully deflect air-flow sensor flap)	80 ... 600 Ω
term. 7 and term. 8 deflect	200 ... 1000 Ω
term. 8 and term. 9	140 ... 280 Ω

Pressure sensor (altitude sensor)

300 m altitude (977 mbar):	2.0 ... 4.0 V
4000 m altitude (616 mbar):	8.0 ... 12.0 V
Resistance between term. 2 (--) and term. 3 (+):	2.3 ... 2.8 kΩ



Test specifications

Relay set

- Resistance measurement between term. 86b (positive) and term. 85:
0 332 514 127 70 ... 500 Ω

Idle-speed adjustment

Engine at op. temp.: approx. +80°C

- Idle speed:
for manually-shifted transmission 800 ... 900 min⁻¹
for automatic transmission 700 ... 800 min⁻¹
- CO adjustment via lambda closed-loop control

Lambda closed-loop control

- Integrator voltage:
Connect lambda closed-loop control tester KDJE-P 600 or analog voltmeter ($R_i \geq 20 \text{ k}\Omega/\text{V}$) to test pin, term. 22 of control unit.

Closed-loop control mode
(sensor connected)

Voltage indication
oscillates between
2 values.

Open-loop control mode
(sensor lead disconnected)

Voltage indication
must equal mean
value of oscill.

Rich value (disconnect sensor
lead and connect to
ground at control-
unit end)

10 ... 12 V

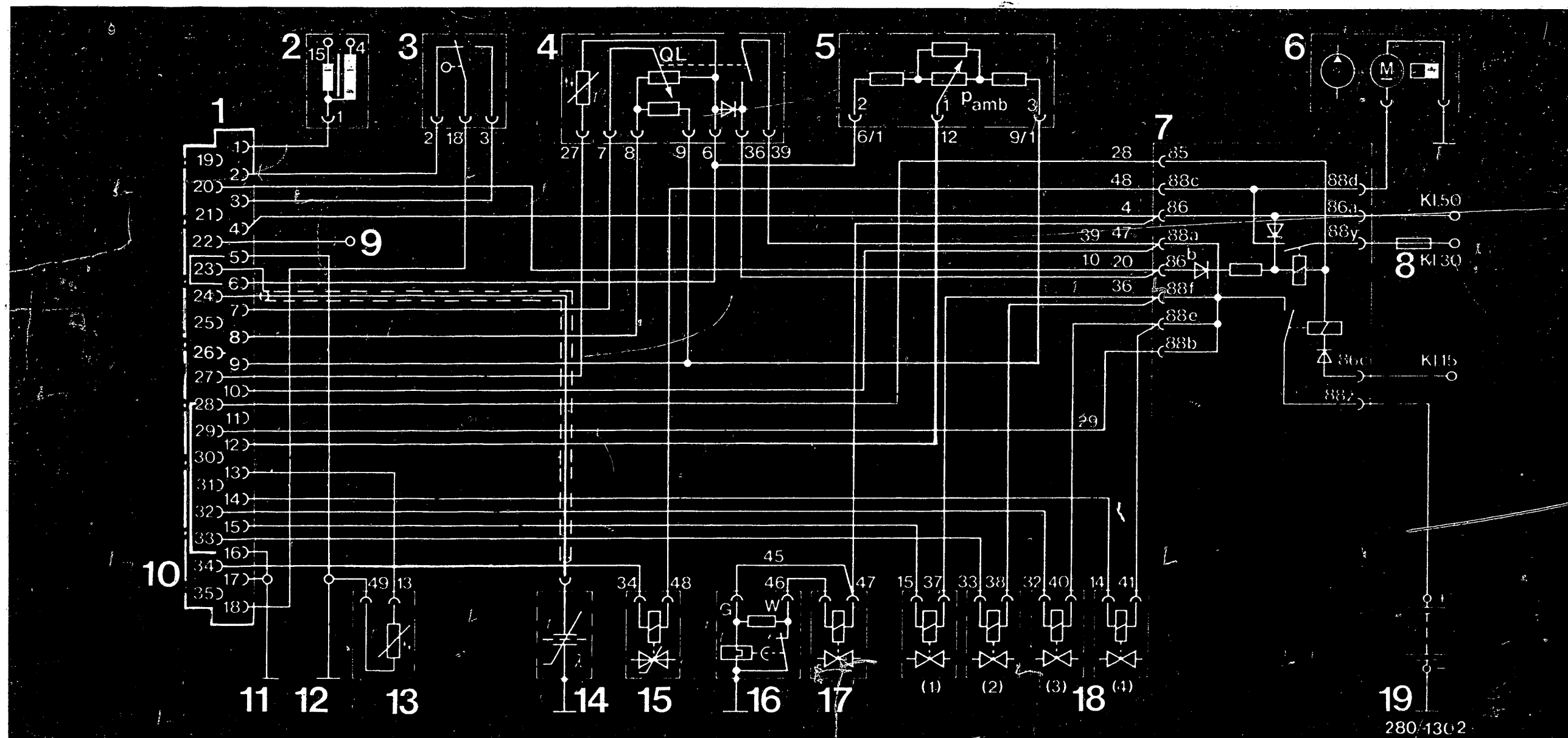
Lean value (apply 2 V to the
sensor lead at
control-unit end)

approx. 0.5 V

For the period of exhaust-emission measurement and adjustment, switch off suction plant.

See Equipment and Autodata microcard for adjustment values for the ignition system, valve clearance and other engine data.





ELECTRICAL TERMINAL DIAGRAM

- 1 = Control-unit plug
- 2 = Ignition coil
- 3 = Throttle-valve switch
- 4 = Air-flow sensor
- 5 = Pressure sensor (altitude sensor)
- 6 = Electric fuel pump
- 7 = Relay set

- 8 = Fuel pump fuse
- 9 = Test pin (integrator voltage of lambda closed-loop control)
- 10 = Bridge in control unit
- 11 = Ground terminal, output stage
- 12 = Ground terminal, electronics
- 13 = Temperature sensor II (engine)

- 14 = Lambda sensor
- 15 = Auxiliary-air device
- 16 = Thermo-time switch
- 17 = Start valve
- 18 = Solenoid-operated injection valve
- 19 = Battery

F13

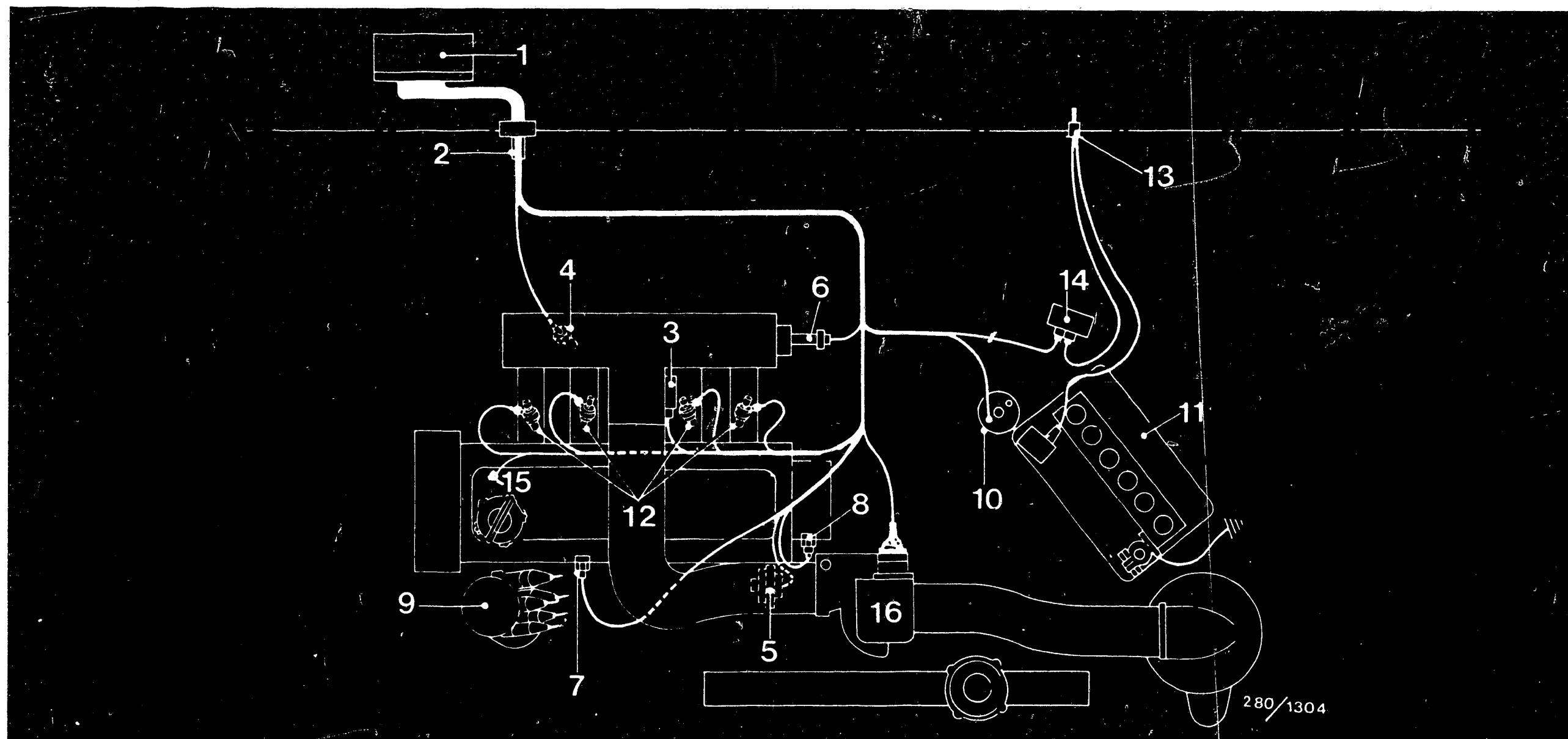
Electrical terminal diagram
Fiat



F14

Electrical terminal diagram
Fiat





Electrical wiring diagram and arrangement of individual components

- 1 = Control unit
- 2 = Jetronic wiring harness
- 3 = Throttle-valve switch
- 4 = Lambda sensor
- 5 = Auxiliary-air device
- 6 = Start valve

- 7 = Thermo-time switch
- 8 = Temperature sensor II
- 9 = Ignition distributor
- 10 = Ignition coil
- 11 = Battery
- 12 = Injection valves

- 13 = Vehicle wiring harness
- 14 = Relay set
- 15 = Ground terminal
- 16 = Air-flow sensor

F15

Electrical wiring diagram
Fiat



F16

Electrical wiring diagram
Fiat



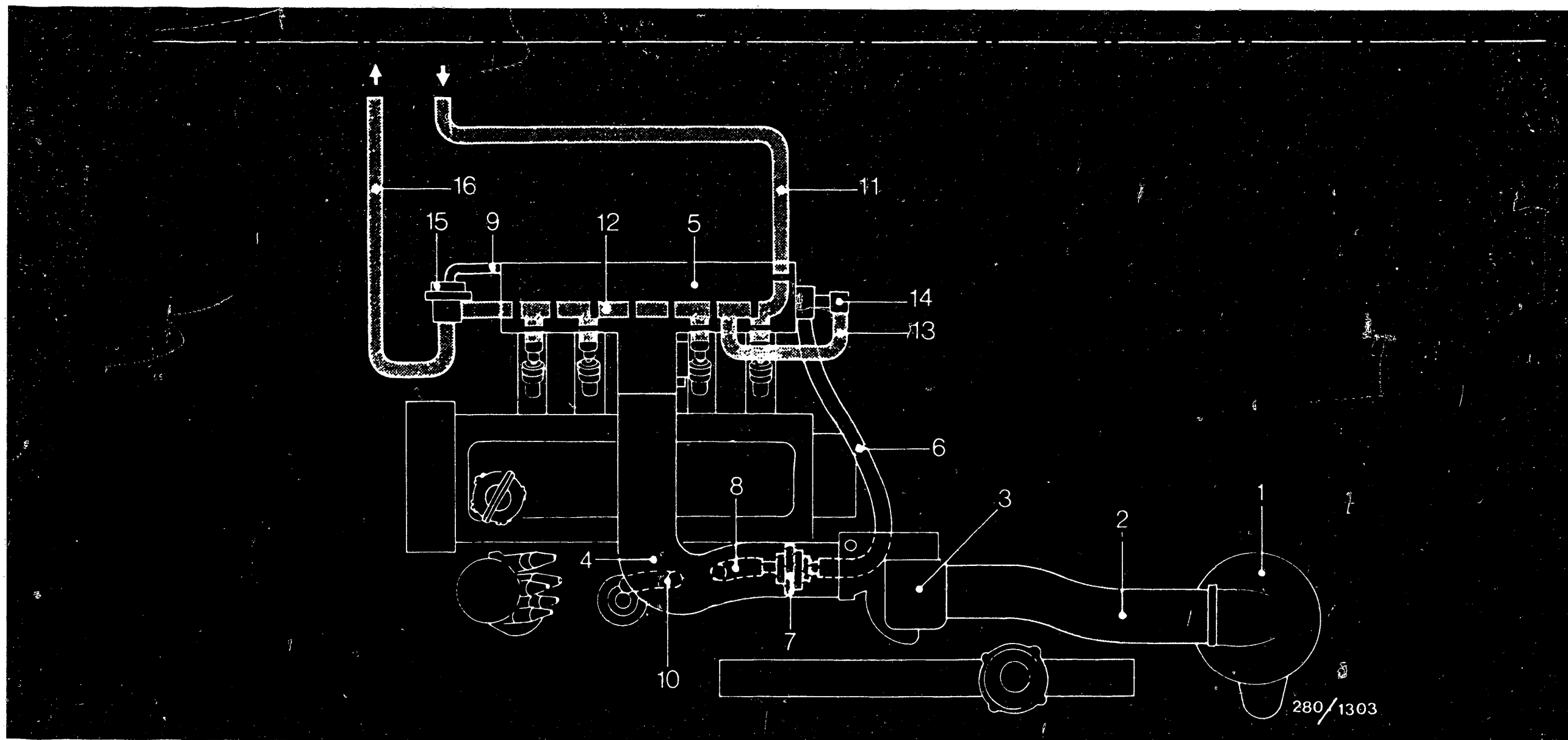


Diagram of air and fuel lines

- | | | |
|--|---|---------------------------------|
| 1 = Air filter | 7 = Auxiliary-air device | 13 = Supply line to start valve |
| 2 = Air hose between air filter and air-flow sensor | 8 = Connecting hose from auxiliary-air device and intake manifold | 14 = Start valve |
| 3 = Air-flow sensor | 9 = Connecting hose to pressure regulator | 15 = Pressure regulator |
| 4 = Air hose between air-flow sensor and intake manifold | 10 = Crankcase ventilation | 16 = Fuel return line |
| 5 = Intake manifold with throttle valve | 11 = Fuel supply line | |
| 6 = Connecting hose for auxiliary-air device | 12 = Fuel-distribution pipe | |

F17

Diagram of air and fuel lines

Fiat

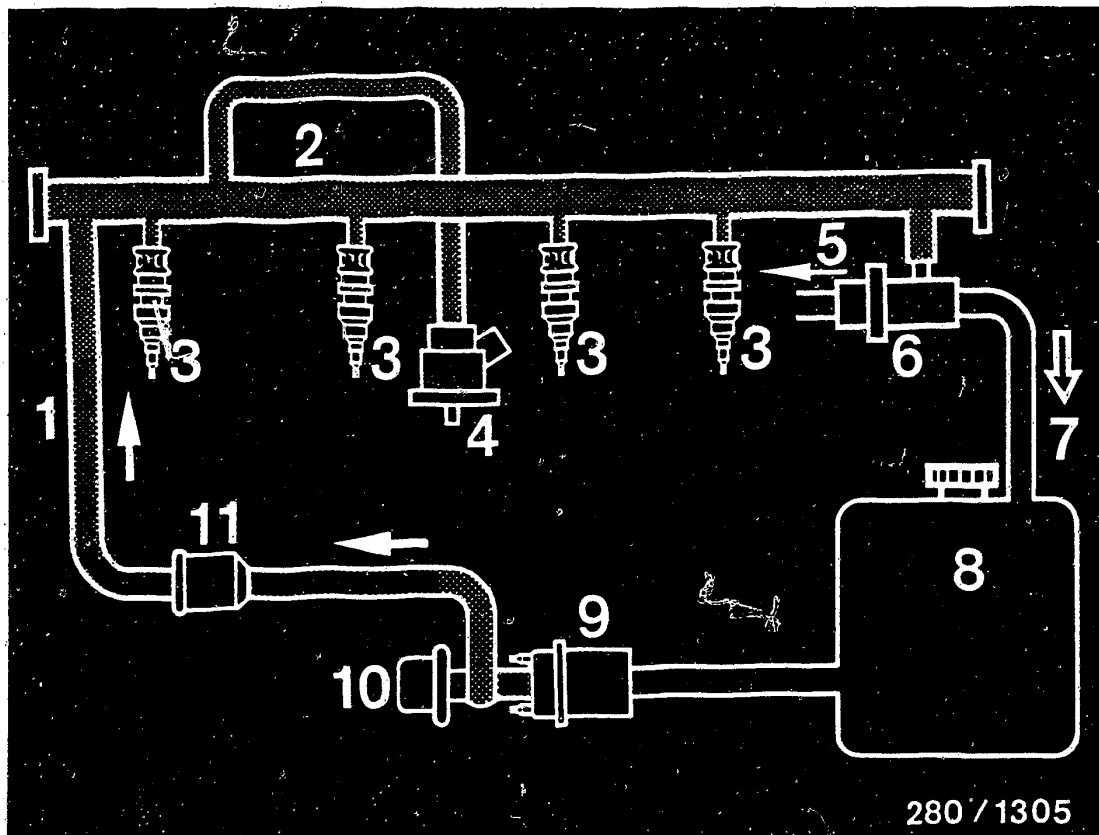


F18

Diagram of air and fuel lines

Fiat





280 / 1305

Fuel Line Diagram



Pressureless

Fuel pressure

1 = Delivery line

7 = Return line

2 = Fuel-distribution pipe

8 = Fuel tank

3 = Solenoid-operated injection valves

9 = Electric fuel pump

4 = Cold-start valve

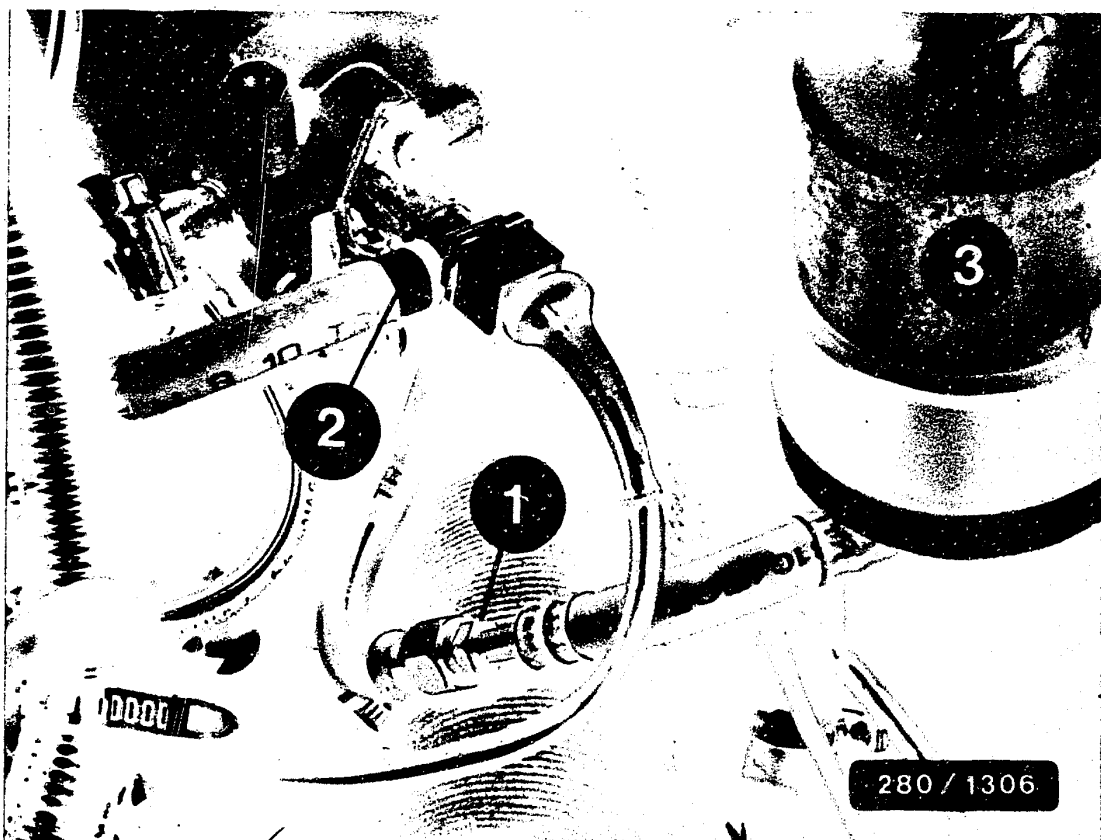
10 = Pressure damper

5 = Intake manifold

11 = Fuel filter

6 = Pressure regulator





- 1 = Screw connection
- 2 = Hose tape
- 3 = Fuel filter

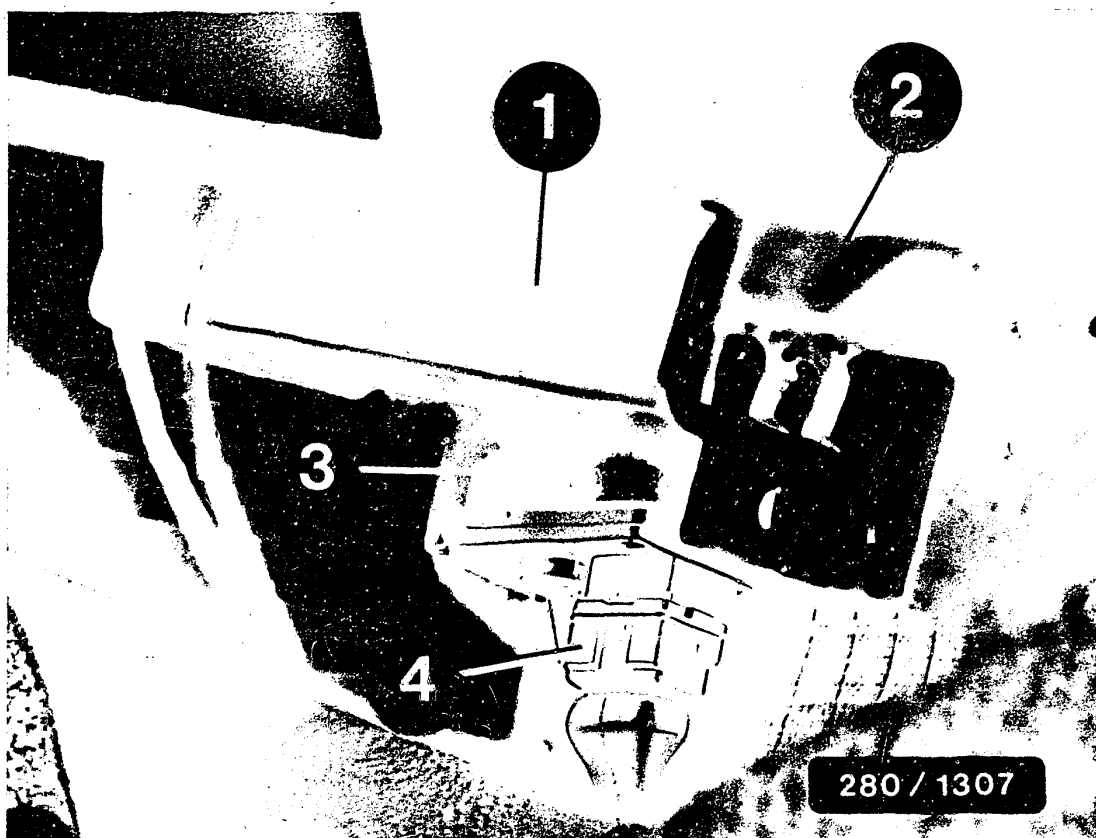
Fuel pressure test

Insert connection piece KDJE-P 100/14 at screw connection and test fuel pressure using pressure measuring device KDJE-P 100.

If this screw connection is not present, the pressure-measuring device with the 3-way lead KDJE-P 100/13 may be inserted at the start valve.
Do not damage fuel hose.

Make sure that fuel does not get onto hot engine components.





1 = Control unit
2 = 35-pin control-unit
plug

3 = Pressure sensor
(altitude sensor)
4 = 3-pin connector

Installation position of components

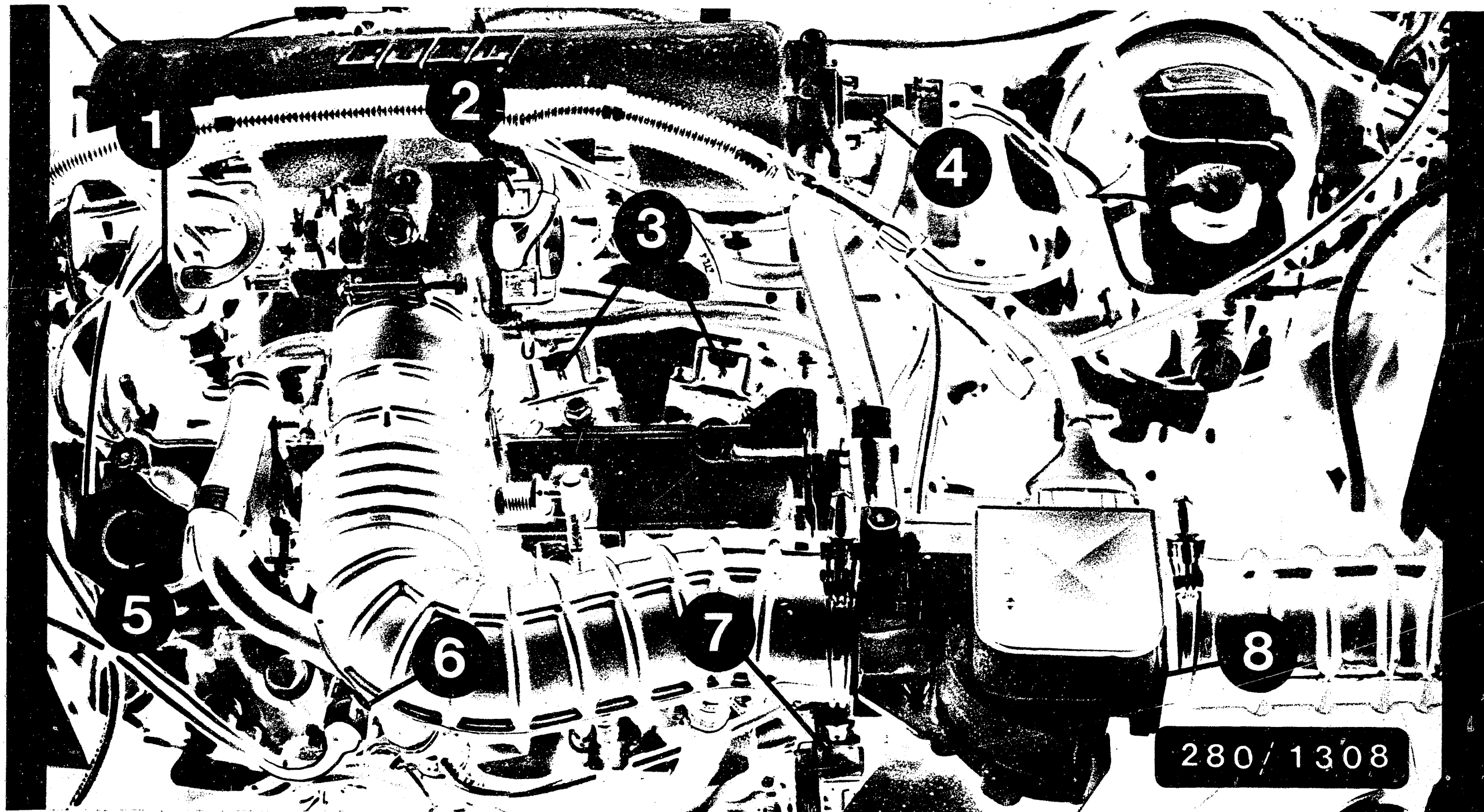
● Control unit in passenger compartment

All installation-position instructions are given with respect to the forward direction of travel:

Control unit and pressure sensor are positioned behind the glove compartment.

For testing, connect the universal test adapter with 35-pin adapter lead to the control-unit plug.





280/1308

● Arrangement of the components at the engine

1 = Pressure regulator
2 = Throttle-valve switch

3 = Solenoid-operated injection valves

4 = Start valve
5 = Ground terminal
6 = Thermo-time switch

7 = Auxiliary-air device
8 = Air-flow sensor

F22

Installation position of components
Fiat



F23

Installation position of components
Fiat



Installation position of components (continued)

- | | |
|---|--|
| ● Electric fuel pump and pressure damper: | Beneath the vehicle, on right in front of fuel tank. |
| ● Temperature sensor: | At coolant distributor, on left at cylinder head. |
| ● Relay set: | At rear of battery holder or behind the firewall on right. |
| ● Lambda sensor | At front of exhaust pipe. |
| ● Lambda-sensor plug connection | On left near intake manifold or near relay set. |
| ● Test pin (integrator voltage of lambda closed-loop control) | On left near intake manifold. |



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BOSCH sytem	: K-Jetronic
Make of vehicle	: AUDI
Basic microcard	: AUD-506

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General safety instructions.....	17
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This microcard contains the K-Jetronic troubleshooting instructions, valid at the time of publication, for the following models:

- G2**

Audi 200/5000 Quattro



2. TEST SPECIFICATIONS

Test step

Test specifications *

2.1 Electric fuel pump

- Fuel delivery (measured in return):
at least 950 cm³/30 s
- Supply voltage (under load):
at least 11.5 V

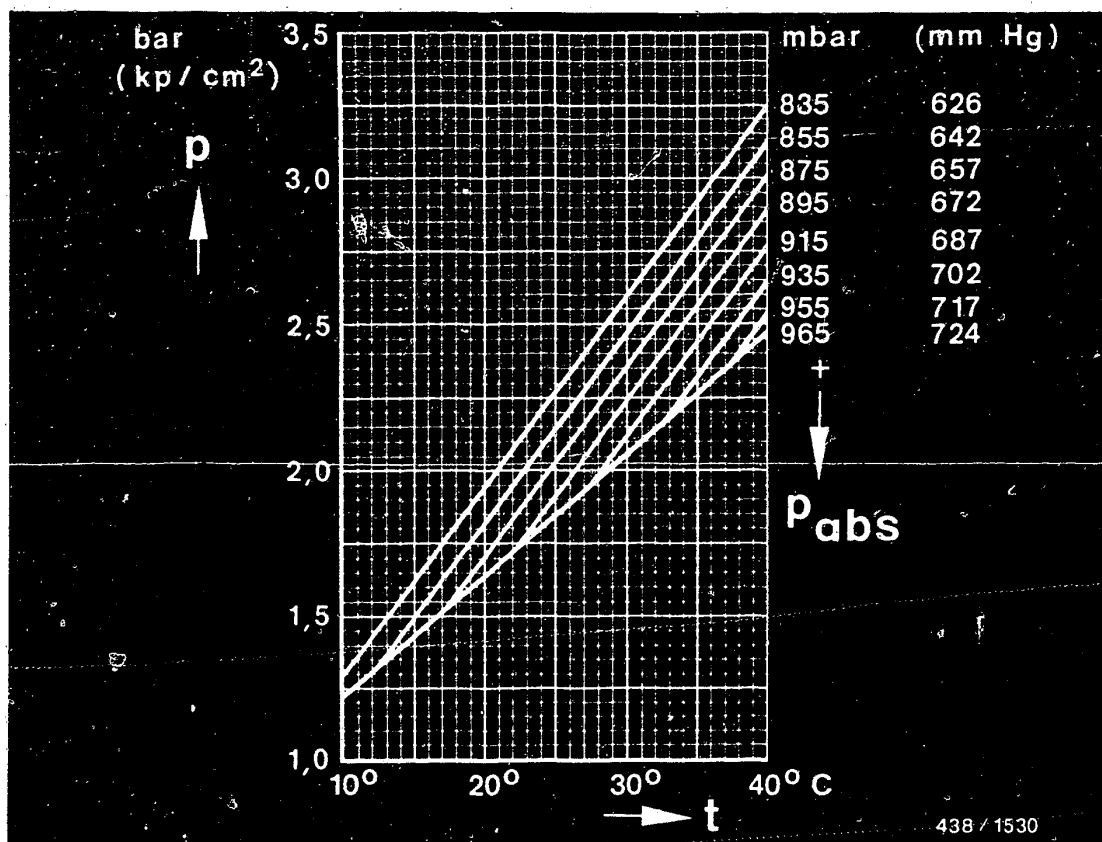
2.2 Fuel distributor

0 438 100 147

● Primary pressure	Test specifications:	Settings:
	5.6...6.3 bar (5.7...6.4 kp/cm ²)	5.8...6.0 bar (5.9...6.1 kp/cm ²)

* Pressure details in the test-specifications table in bar (overpressure) and in kp/cm² (overpressure).





p = control pressure (gauge pressure)
 t = ambient temperature
 p_{abs} = air pressure

2.3 Warm-up regulator

Version for altitude correction 0 438 140 157/... 158

- Fuel delivery for the control-pressure circuit: 160...240 cm³/min.

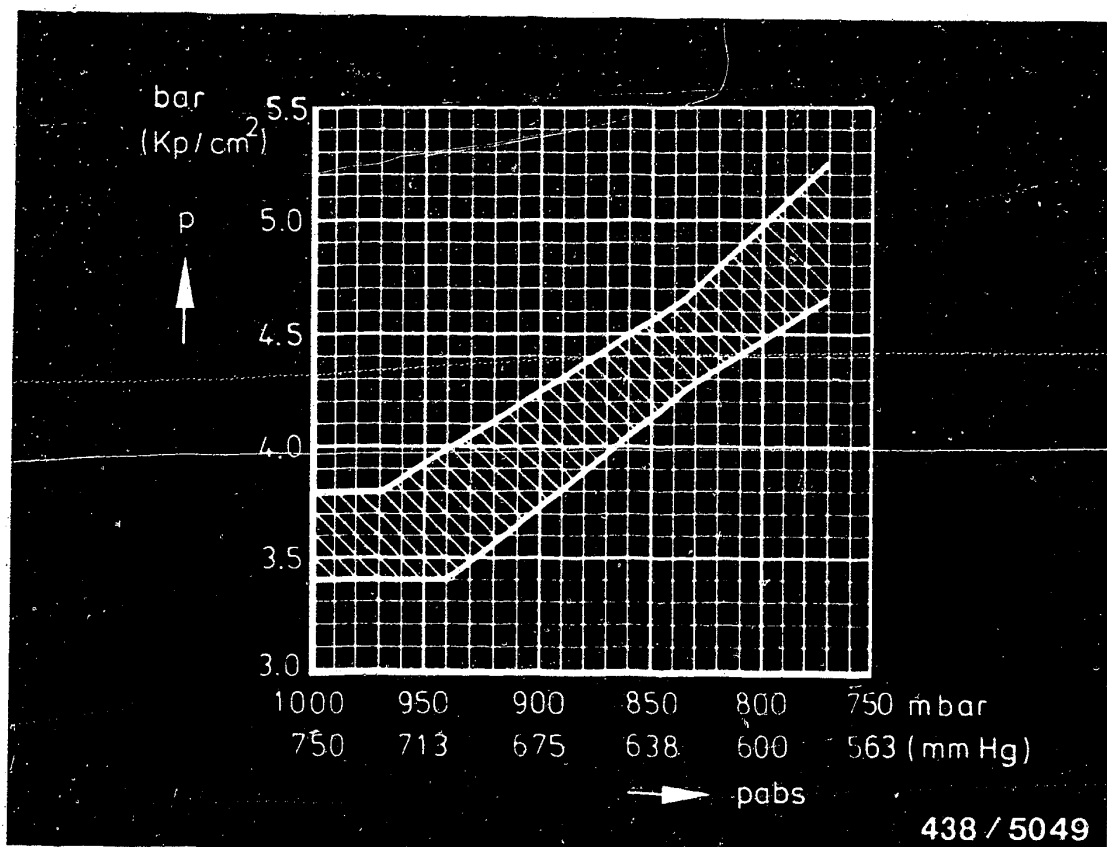
- Control pressure "cold"

Read control pressure set point on graph opposite corresponding ambient temperature and atmospheric pressure.

A tolerance of ± 0.2 bar applies to the basic control pressure curve.

A tolerance of ± 0.25 bar applies to the control pressure altitude curves.

The basic curve applies to atmospheric pressure greater than 965 mbar (724 mm Hg).



p = control pressure (gauge pressure)
pabs = air pressure

● "Warm" control pressure

Warm-up regulator order number: 0 438 140 157/...158
(model with altitude compensation)

Measure the control pressure immediately after the warm-up regulator has settled.

G5

Test specifications

Audi 200/5000 Quattro



Test step

Test specifications*

2.4 Fuel accumulator

0 438 170 052

0 438 170 053

● Leakage test

minimum pressure:

after 10 mins.

after 20 mins.

3.4 bar

3.3 bar

(3.5 kp/cm²)

(3.2 kp/cm²)

2.5 Injection valve

0 437 502 032

0 437 502 033

● Opening pressure:

3.7...4.8 bar

(3.8...4.9 kp/cm²)

● Leakage test

not below 3.5 bar:

No drop must drip
within 20 s.

2.6 Fuel distributor

0 438 100 147

● Comparative measurement of fuel deliveries:

	Adjusting point	Max. permissible fuel delivery
Idle	6.0 cm ³ /min.	6.7 cm ³ /min.
Part load	40.0 cm ³ /min.	43.0 cm ³ /min.
Full load	160.0 cm ³ /min.	175.0 cm ³ /min.

Full-load delivery (air-flow sensor plate fully
deflected) measured using measuring glass: at least:
185 cm³/min.

* Pressure details of the test specifications in bar
(overpressure) and in kp/cm² (overpressure)

G6

Test specifications

Audi 200/5000 Quattro



Test step

Test specifications

2.7 Idle adjustment*

● Idle speed

Manually-shifted

transmission: 750...850 min⁻¹

Automatic transmission: 670...770 min⁻¹

With idle-actuator current

Air conditioner switched off: 410...450 mA

Air conditioner switched on:

Manually-shifted

transmission: 470...510 mA

Automatic transmission: 480...520 mA

● CO concentration

0.3...1.2% by vol.
(only for checking)

with on/off ratio

oscillating

Test specification: 25...65%

Setting 42...58%

* For checking and adjusting idle:

Switch off air conditioner. Engine at normal operating temperature, oil temperature approx. +80°C. Radiator fan must not be running while setting. Put overrun cut-off and exhaust-gas recirculation (if fitted) out of operation. Disconnect crankcase ventilation hose from cylinder-head cover and seal end of hose.



Test step

Test specifications

2.8 Lambda closed-loop control*

● On-off ratio:

Open-loop control: 45...55%

Cold-start enrichment: 75...85%

Full-load enrichment: 55...65%

Closed-loop control
oscillating between: 25...65%

Lambda sensor heater

- Internal electrical resistance (PTC)
(measured with engine switched off): 1 ... 15 Ω

Timing valve

- Internal electrical
resistance at +20°C: 2.0...3.0 Ω
- Line resistor: 9.0...10.0 Ω

2.9 Temperature sensor I (Air)

- Internal electrical
resistance: 400...700 Ω

2.10 Temperature sensor II (Engine)

- Internal electrical
resistance: 60...1000 Ω

2.11 Potentiometer at air-flow sensor

Total resistance 3000...5000 Ω
Idle resistance 500... 900 Ω
Full-load resistance 3500...6000 Ω

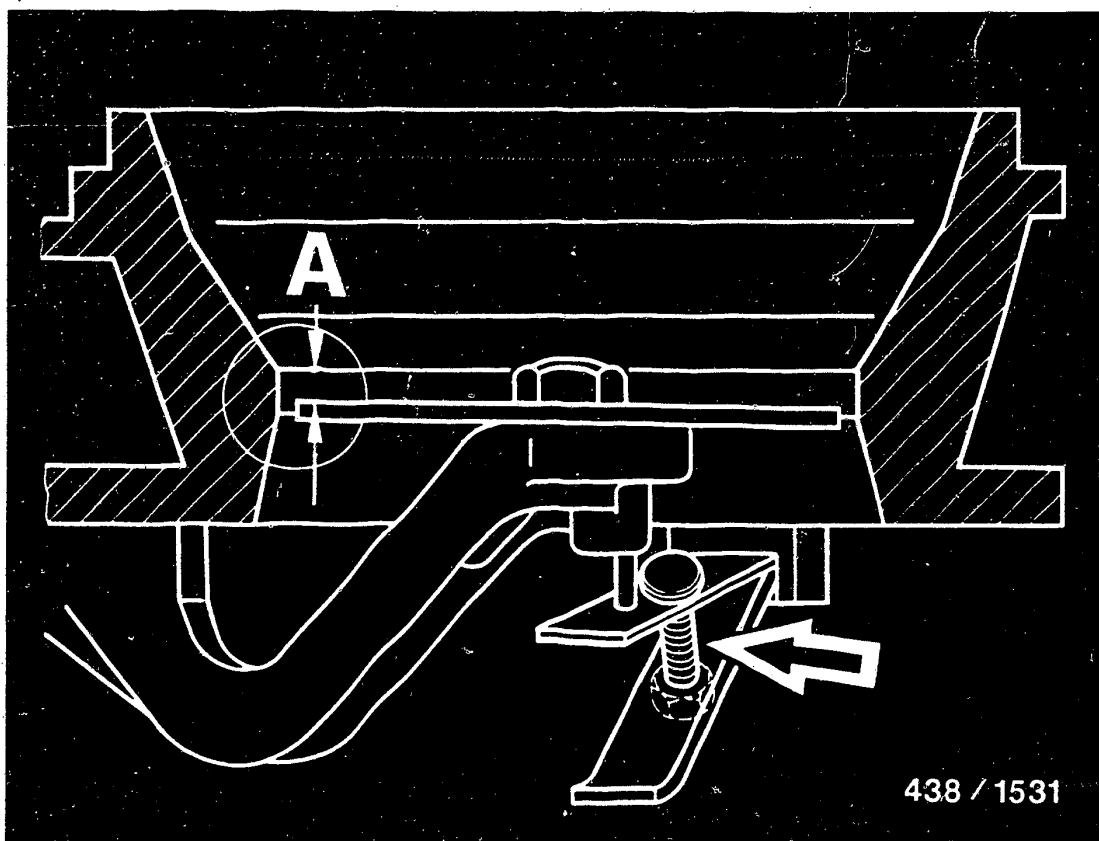
* Functional check and adjustment of lambda closed-loop control:

Warm up engine with lambda sensor connected.

On/off ratio at $n \leq 2000 \text{ min}^{-1}$: 45...55%
at $n \geq 2000 \text{ min}^{-1}$: oscillating
25...65%

CO value serves only as a check.



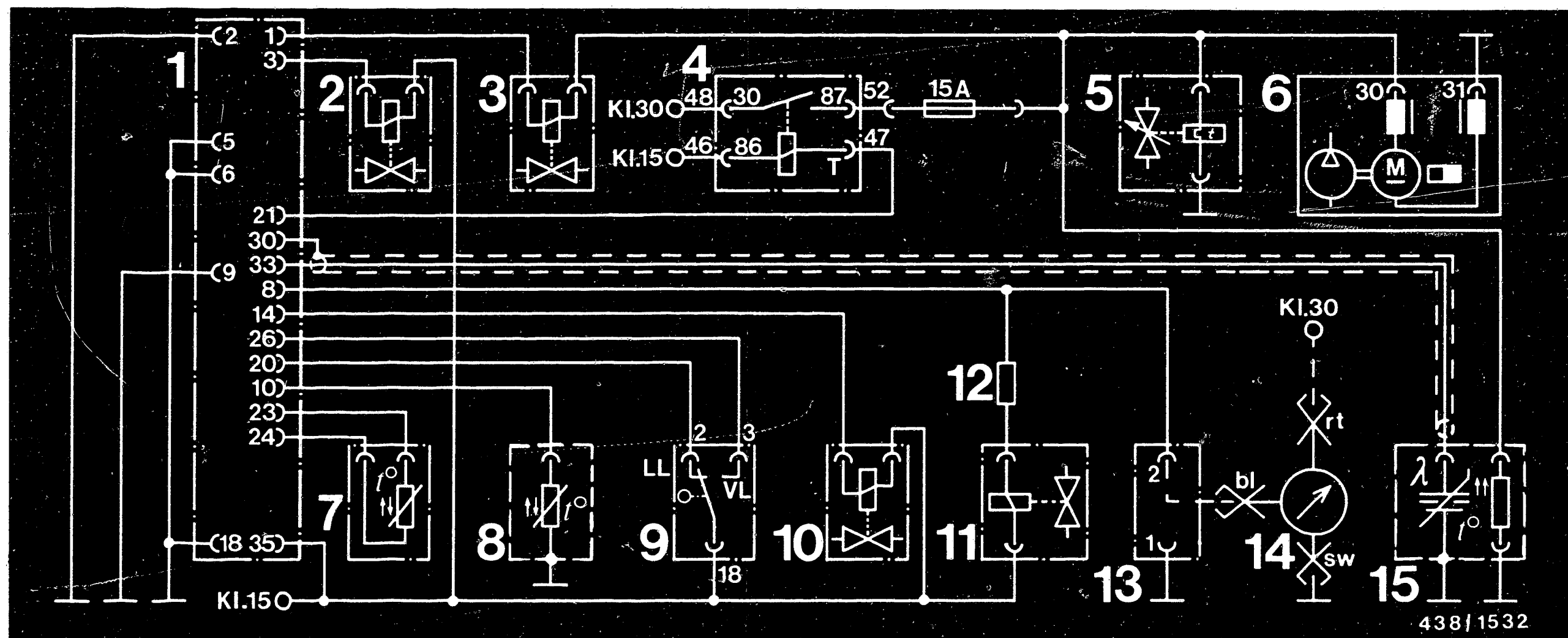


2.12 Checking and adjusting at mixture-control unit

The lower control-piston seal corresponds to that of the KE fuel distributor.

- Zero position of air-flow sensor plate
(measured from cone edge): $A = 1.9...2.1 \text{ mm}$
Adjustment at the leaf-spring limiting screw (arrow).
- Travel between zero position and control piston
(measured in air-flow sensor plate center): $1...2 \text{ mm}$
Adjustment at the slotted round nut of the control-piston seal. 0.1 mm screw penetration results in approx. 0.7 mm at the air-flow sensor plate center.
- Basic setting of control lever
(measured from fuel-distributor support lugs up to needle bearing): $21.2...21.4 \text{ mm}$
Adjustment at the idle-mixture-adjusting screw.





1 = Control unit for ignition and injection

2 = Activated-carbon filter valve

3 = Cold-start valve

4 = Injection relay

5 = Warm-up regulator

6 = Electric fuel pump

7 = Temperature sensor, "Air" (NTC I)

8 = Temperature sensor, "Engine" (NTC II)

9 = LL and VL throttle-valve switches

10 = Overrun-cutoff valve

11 = Timing valve

12 = Line resistor

13 = Test connection

14 = Lambda closed-loop control tester KDJE-P 600

15 = Lambda sensor

bl = blue

rt = red

sw = black

3. ELECTRICAL SAFETY CIRCUIT

with control unit (non-Bosch product) for ignition and injection

3.1 Diagram

The safety circuit with injection relay is actuated by terminal 21 of the control unit. Likewise actuated by the control unit are the following functions:

- Starting enrichment via cold-start valve.
- Warm-up enrichment by temperature sensor, "Engine".
- Lambda closed-loop control by lambda sensor and timing valve with line resistor.

G10

Electrical safety circuit

Audi 200/5000 Quattro

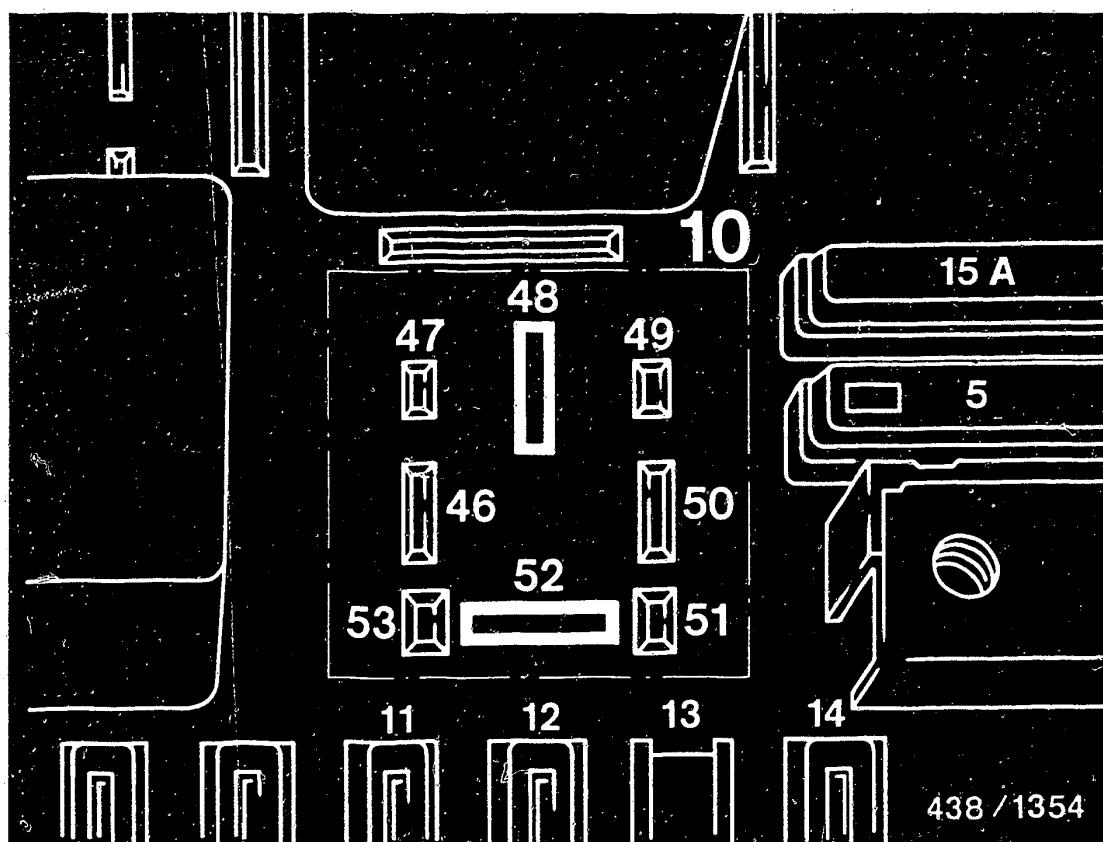


G11

Electrical safety circuit

Audi 200/5000 Quattro





10 = Position of injection relay

3.2 Bridge safety circuit for testing

To do this, pull the injection relay out of the relay plate. Connect contacts 48 and 52 using a connecting lead. Use a 1.5 mm² connecting lead with safety element and 16 A fuse.

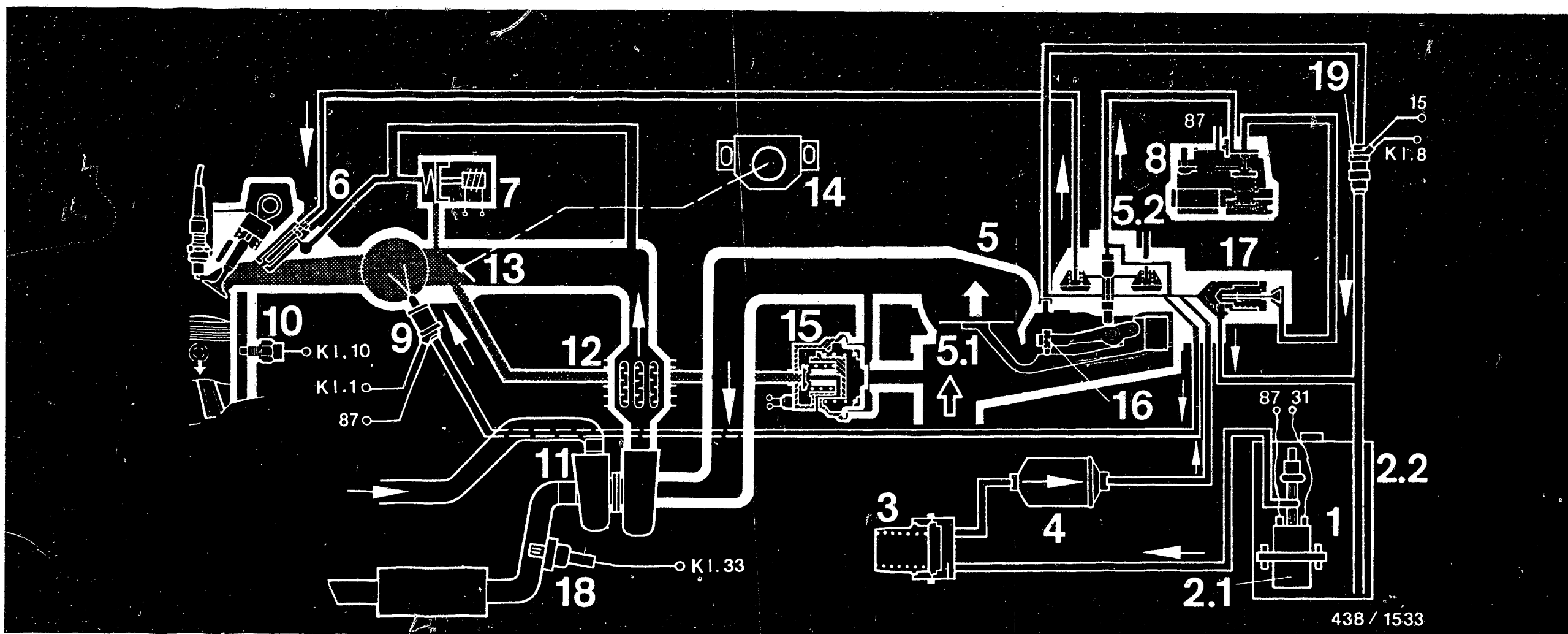
In this way, the electric fuel pump and the warm-up regulator are supplied with battery voltage.

C A U T I O N !

Never deflect (lift) the air-flow sensor plate when the electric fuel pump is running, since fuel is then injected via the injection valves.

Actuation of the starting motor after fuel has been injected may lead to most serious damage to the engine!





4. DIAGRAM OF FUEL LINES

 Fuel lines



Intake-manifold pressure lines

Term. = Terminal at control unit of
ignition and injection functions

- 1 = Fuel tank
- 2.1 = In-tank electric fuel pump
- 2.2 = Pressure damper
- 3 = Fuel accumulator
- 4 = Fuel filter
- 5 = Mixture-control unit
- 5.1 = Air-flow sensor
- 5.2 = Fuel distributor

- 6 = Injection valve
- 7 = Idle actuator
- 8 = Warm-up regulator
- 9 = Cold-start valve
- 10 = Temperature sensor, "Engine"
- 11 = Exhaust turbo-supercharger
- 12 = Intercooler
- 13 = Throttle valve

- 14 = Throttle-valve switch
- 15 = Overrun-cutoff valve
- 16 = Idle-mixture-adjusting screw
- 17 = Primary-pressure regulator with
push valve
- 18 = Lambda sensor
- 19 = Timing valve

G13

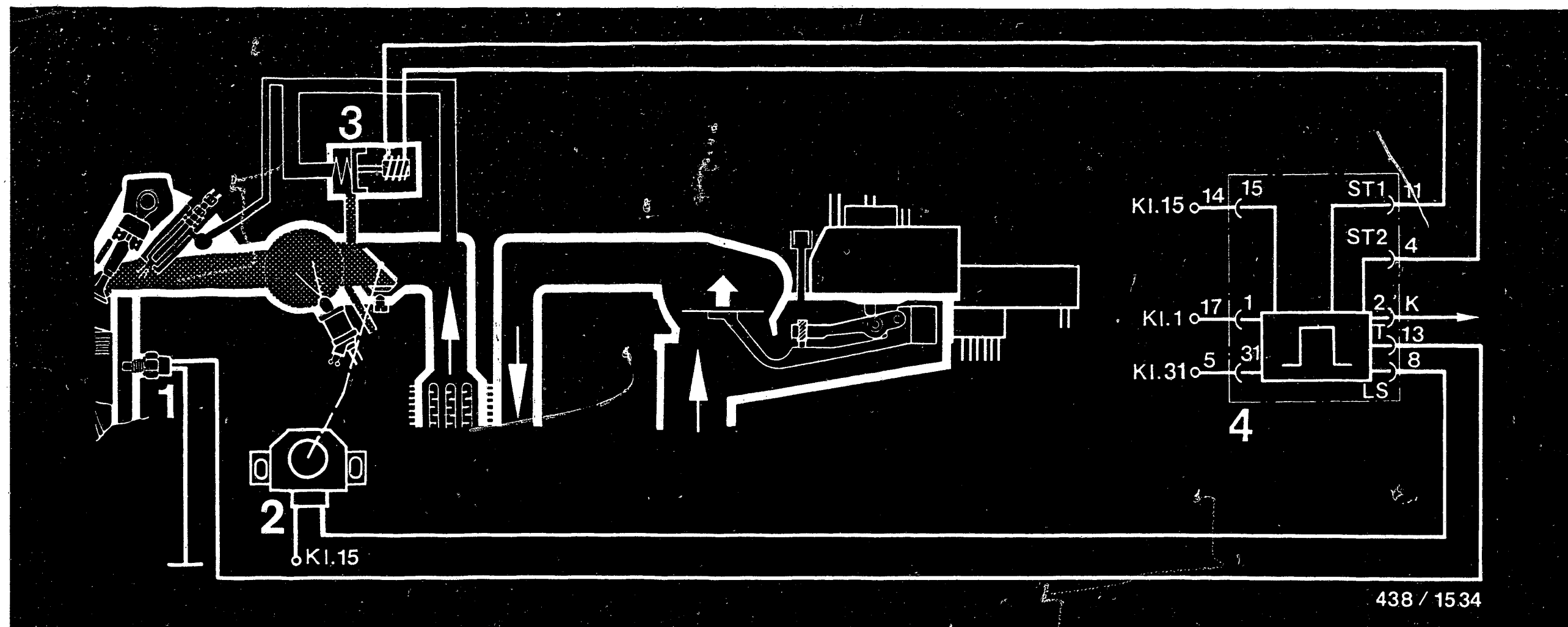
Diagram of fuel lines
Audi 200/5000 Quattro



G14

Diagram of fuel lines
Audi 200/5000 Quattro





1 = Temperature sensor, "Engine"
2 = Throttle-valve switch

3 = Idle actuator
4 = Control unit for idle-speed stabilization

K = To air-conditioner compressor

5. IDLE-SPEED STABILIZATION (non-Bosch product)

• Operation

The idle speed is stabilized by the electronic control unit of the idle actuator. Instead of the auxiliary-air device which is otherwise usual, the idle actuator is installed in the air bypass to the throttle valve.

The tractive electromagnet of the idle actuator receives from the control unit a variably pulsed voltage with a constant frequency. As a result, the screen in the air duct is adjusted and the rate of air flow altered.

G15

Idle-speed stabilization
Audi 200/5000 Quattro



G16

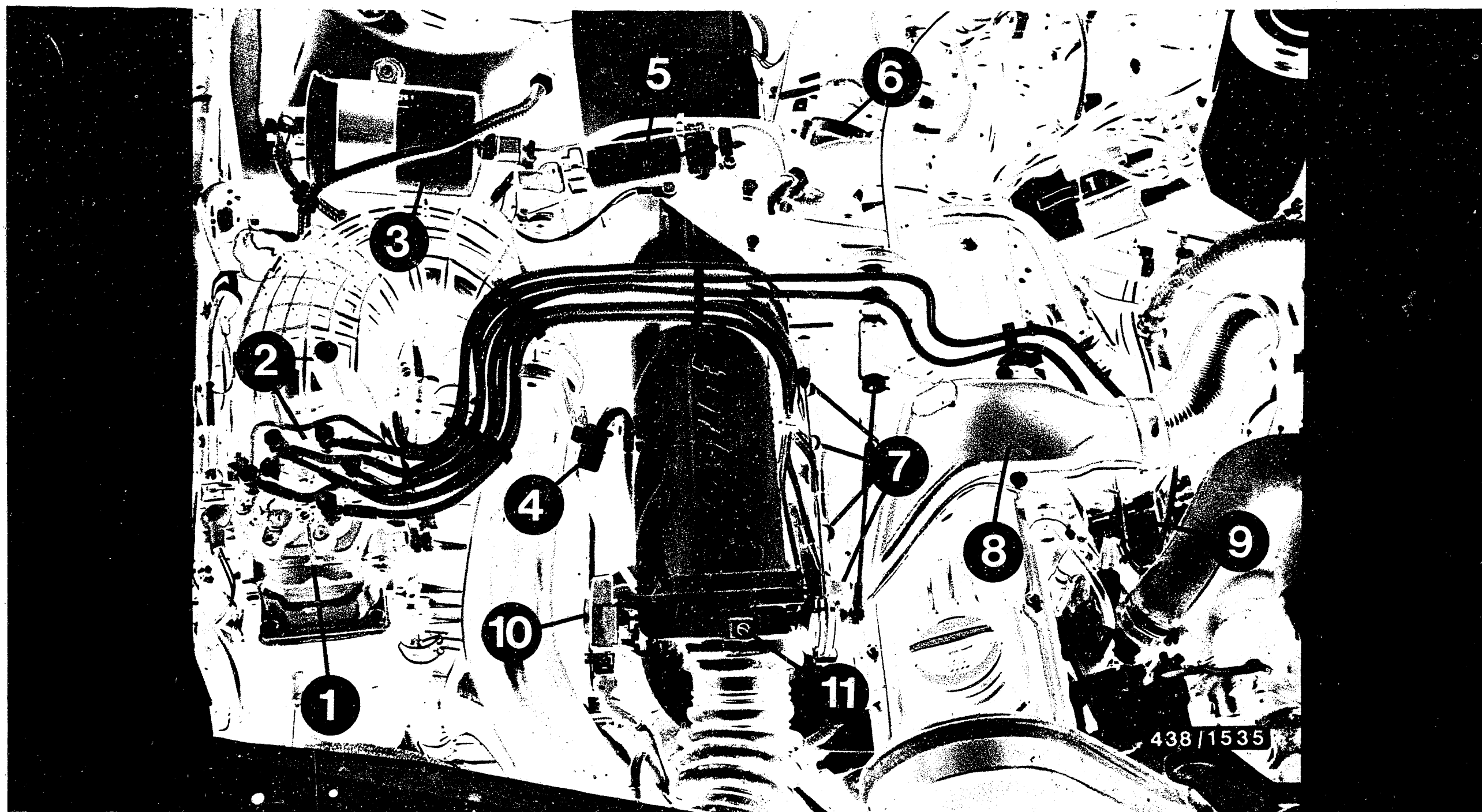
Idle-speed stabilization
Audi 200/5000 Quattro



6. GENERAL SAFETY INSTRUCTIONS WHEN WORKING ON THE K-JETRONIC

- Never deflect (lift) the air-flow sensor plate when the electric fuel pump is running, since fuel is injected via the injection valves.
Actuation of the starting motor may then lead to most serious damage to the engine.
- Observe the test equipment regulations when testing the injection valves using the valve tester. Never test using standard gasoline or other highly inflammable fluids.
Even when using white spirit, observe the safety regulations of the workplace.
- Leakage test of motor intake system only with permissible leakage detector (e.g. Gypoflex). Do not use highly inflammable fluids. Observe the safety regulations of the workplace.





438/1535

7. INSTALLATION POSITION OF COMPONENTS

7.1 Arrangement of components at engine

- | | | | |
|---|-------------------------------|--|--|
| 1 = Mixture-control unit | 3 = Fuel filter | 7 = Injection valves | 10 = Throttle-valve switch |
| 2 = Idle-mixture-adjusting screw (adjustment of on/off ratio of lambda closed-loop control) | 4 = Exhaust-sample connection | 8 = Auxiliary fan for injection valves | 11 = Adjustment of idle-actuator current |
| | 5 = Idle actuator | 9 = Warm-up regulator | |
| | 6 = Turbo blow-off valve | | |

G18

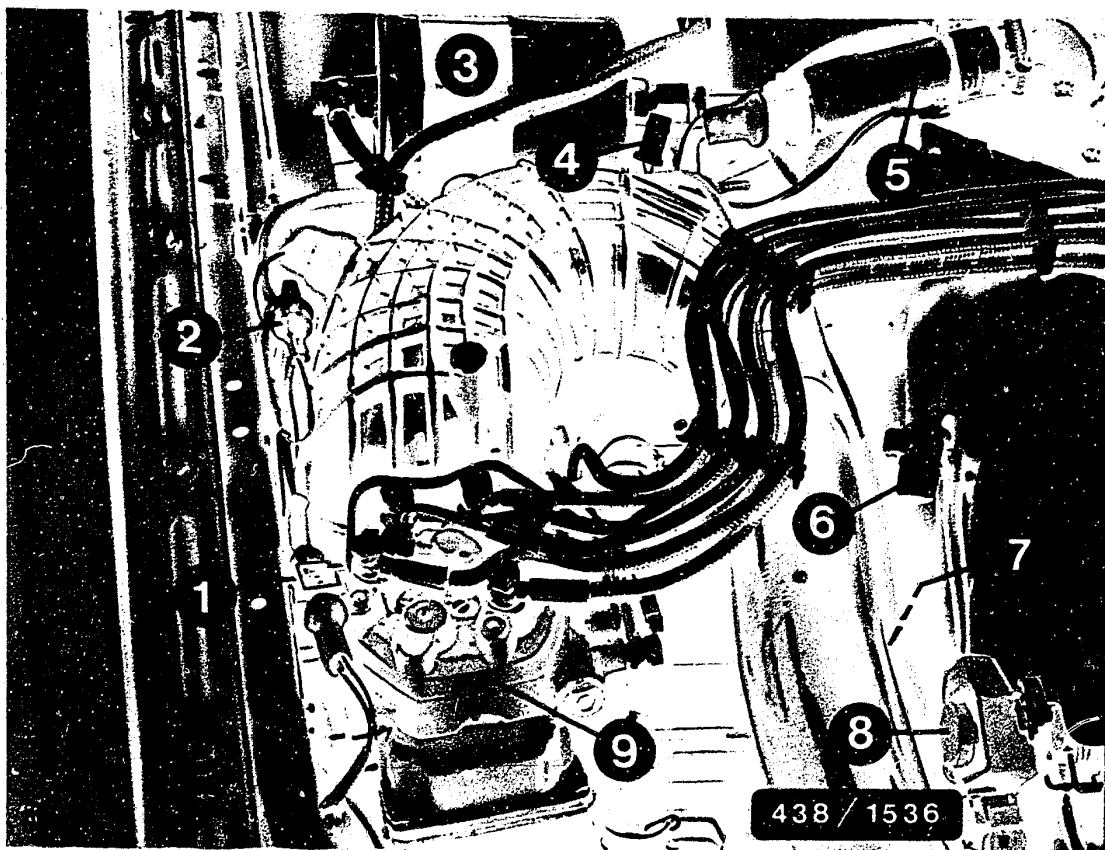
Installation position of components
Audi 200/5000 Quattro



G19

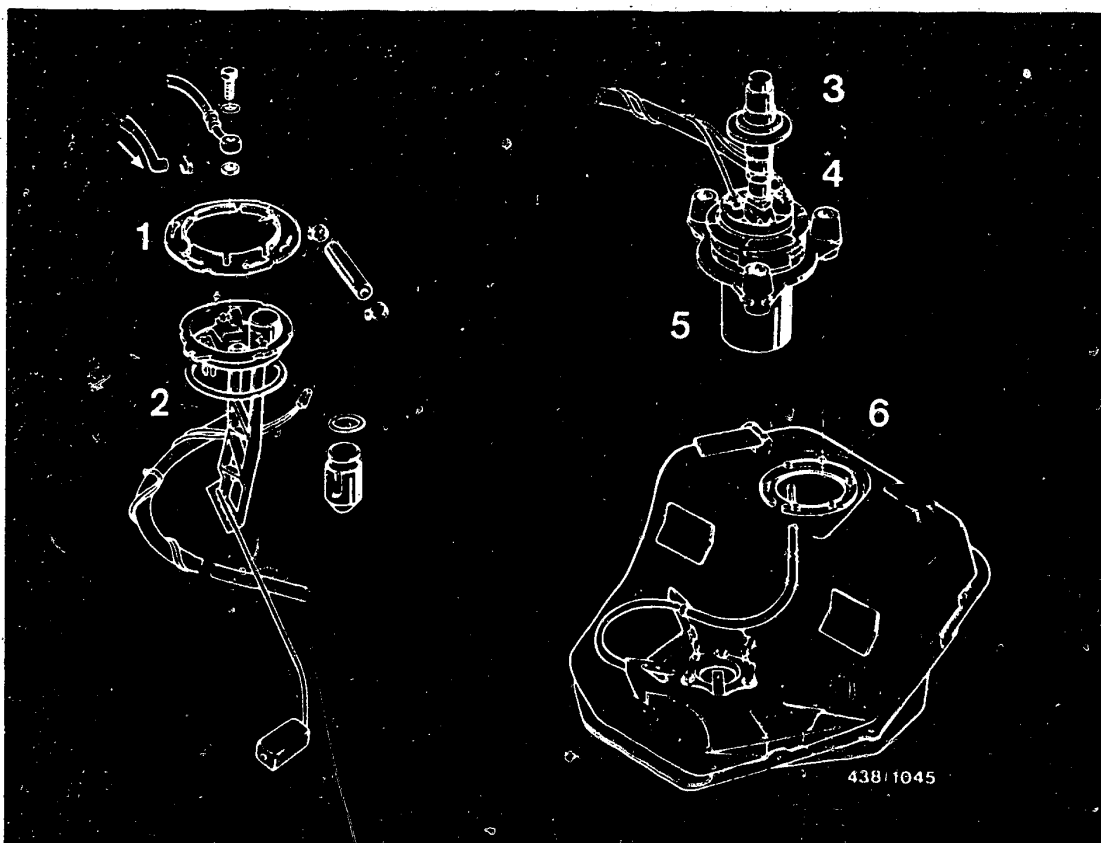
Installation position of components
Audi 200/5000 Quattro





- 1 = Plug connection of lambda-sensor heater
- 2 = Plug connection for lambda-sensor signal
- 3 = Fuel filter
- 4 = Test connection for on/off ratio
- 5 = Idle actuator
- 6 = Exhaust-sample connection
- 7 = To lambda sensor
- 8 = Throttle-valve switch
- 9 = Mixture-control unit





- | | |
|---------------------------|------------------------|
| 1 = Lock ring | 4 = Non-return valve |
| 2 = Sensor for fuel gauge | 5 = Electric fuel pump |
| 3 = Pressure damper | 6 = Fuel tank |

7.2 Components of fuel supply system

- Access to the in-tank electric fuel pump with replacable non-return valve and bolted-on pressure damper is via the lock ring at the upper side of the fuel tank.
- The fuel accumulator is secured at the underside of the vehicle, on the right in front of the fuel tank.



7.3 Further components

- The control unit (non-Bosch products) for the ignition and injection functions is positioned on the right-hand side of the footwell on the passenger's side.
- The lambda sensor is screwed into the exhaust pipe at the front beneath the intake manifold.
- The timing valve with molded hose is attached at the mixture-control unit (at the right-hand fender).



TABLE OF CONTENTS

Trouble-shooting instructions: ALF-5002

BOSCH system : LE 2-Jetronic

Make of vehicle : ALFA ROMEO

Basic microcard : OPE-502

Section	Coordinates
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SPECIAL FEATURES

These trouble-shooting instructions, valid at the time of publication, apply to the following vehicle models:

ALFA ROMEO Alfa 75 02.86 ->
1.8 1/4-cyl. turbo-supercharged engine

- LE 2-Jetronic with 25-pin control unit, 5-pin air-flow sensor, 7-pin control relay and solenoid-operated injection valves with series resistor.
- Starting control, i.e. additional quantity for injection through all solenoid-operated injection valves.
- Cold-start valve and thermo-time switch not applicable.
- Full-load information not from the throttle-valve switch, but from the EI-K control unit of the ignition.
- In-tank pre-supply pump.

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

- Universal test adapter 0 684 101 801 and
- Adapter lead 1 684 463 123

The following rapid diagnosis chart makes it possible for the experienced L-Jetronic expert to quickly check the electrical part of the system using the universal test adapter.

The rapid diagnosis chart contains the following information:

- Sequence of test steps
- Settings of V and Ω program switches
- Notes on how to operate the universal test adapter or other components.
- Test specifications for motortester and multimeter



Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch setting		Measurement	Remarks	Test specifications (reading)
	V	Ω			
1	5	-	TD signal from EI-K control unit term. 17. On control unit plug between terminals 1 and 5.	Shift to neutral, start.	Rectangular pulse on oscilloscope
2	6	-	Voltage from control relay term. 87b. On control unit plug between terminals 9 and 5.	Shift to neutral, start.	8 ... 15 V
3	7	-	Voltage from starting motor term. 50. On control unit plug between terminals 4 and 5.	Shift to neutral, start.	8 ... 15 V
4	↓	11	Resistance combination in air-flow sensor term. 8. On control-unit plug between terminals 8 and 5.	---	100 ... 200 Ω
5	↓	12	Resistance of potentiometer in air-flow sensor term. 7. On control unit plug between terminals 7 and 5.	Deflect air-flow sensor flap as far as it will go.	60 ... 1000 Ω
6	↓	13	Resistance of temperature sensor NTC II term. 10 (engine temperature). On control unit plug between terminals 10 and 5.	+15° ... +30° C: +80° C:	1.45 ... 3.3 k Ω 280 ... 390 Ω
7	↓	14	Resistance of output stage ground term. 13. On control unit plug between terminals 13 and 5.	----	0 ... 10 Ω
8	↓	16	Resistance of idle contact in throttle-valve switch term. 2. On control unit plug between terminals 2 and 9.	Accelerator in rest position: Accelerator slightly depressed:	0 ... 10 Ω ∞ Ω
9	↓	17	Resistance of full-load output term. 18 of the EI-K control unit. Control-unit plug between terminals 3 and 9.	---	1,5 ... 2,5 k Ω
10	↓	18	Resistance of all 4 parallel-connected solenoid-operated injection valves with series resistors term. 12. Contr.-unit plug betw. term. 12 and 9.	---	+20° C: 4,9 ... 7,5 Ω

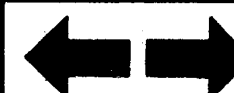
H3

Rapid diag. chart for univ. test adapter
ALFA ROMEO



H4

Rapid diag. chart for univ. test adapter
ALFA ROMEO



Additionally required tests of leads

These leads were not tested with the universal test adapter during rapid diagnosis testing.

From control-unit plug terminal 9 to auxiliary-air-device plug AB1.

From control-unit plug terminal 13 to auxiliary-air-device plug N1.

From control relay terminal SB1.5 to the electric fuel pumps SB.

From the electric fuel pumps to vehicle ground.



TEST SPECIFICATIONS

Pressure regulator

- Fuel pressure: 2.8 ... 3.2 bar

Electric fuel pump

- Fuel delivery at return: at least 750 cm³/30 s
- Supply voltage under load: at least 12 V

In-tank pre-supply pump

- Fuel delivery: at least 850 cm³/30 s

Auxiliary-air device

- Electrical internal resistance 25 ... 60 Ω

Temperature sensor (coolant)

- Electrical internal resistance
at ambient temperature
(+15° C ... +30° C): 1.45 ... 3.3 k Ω
with engine at op. temp.
(approx. +80° C): 280 ... 360 Ω

Air-flow sensor

- Resistance between:
term. 8 and term. 5: 340 ... 450 Ω
term. 7 and term. 5: 60 ... 1000 Ω 1)
term. 9 and term. 5: 500 ... 760 Ω
term. 8 and term. 9: 160 ... 300 Ω

1) (Air-flow sensor flap fully deflected)

Starting control with temperature-sensor connector disconnected

- Terminal voltage at one injection valve:
Drops from initially greater than approx 2.5V to
approx 0.3 V within approx 15 s cranking time.



Test specifications (continued)

Solenoid-operated injection valve

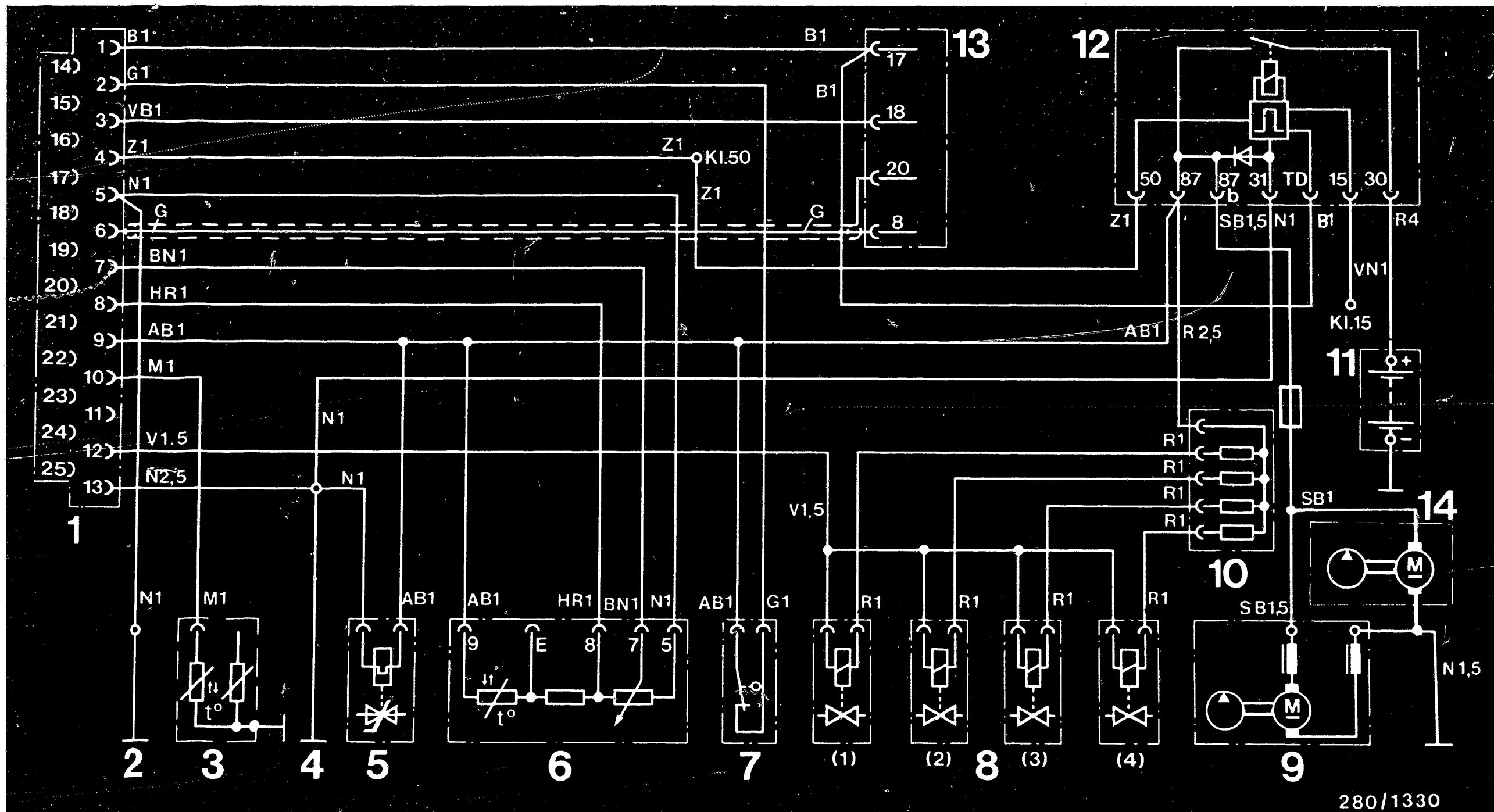
- Internal electrical resistance at +20°C: 2.0...3.0 Ω
- Series resistance: 5.0...7.0 Ω

Idle adjustment (engine at normal operating temperature, approx. +80°C)

- Idle speed: 850...950 min^{-1}
- CO concentration: 0.4...1.2 % by vol.

See equipment and Autodata microcard for settings for ignition, valve clearance and other engine-related data.





ELECTRICAL TERMINAL DIAGRAM

- 1 = Control-unit plug
- 2 = Ground terminal, electronics
- 3 = Temperature sensor (coolant)
- 4 = Ground terminal, output stage

- 5 = Auxiliary-air device
- 6 = Air-flow sensor
- 7 = Throttle-valve switch
- 8 = Solenoid-operated injection valves
- 9 = Electric fuel pump

- 10 = Series resistors
- 11 = Battery
- 12 = Control relay
- 13 = EI-K control unit
- 14 = In-tank pre-supply pump

H8

Electrical terminal diagram
ALFA ROMEO



H9

Electrical terminal diagram
ALFA ROMEO



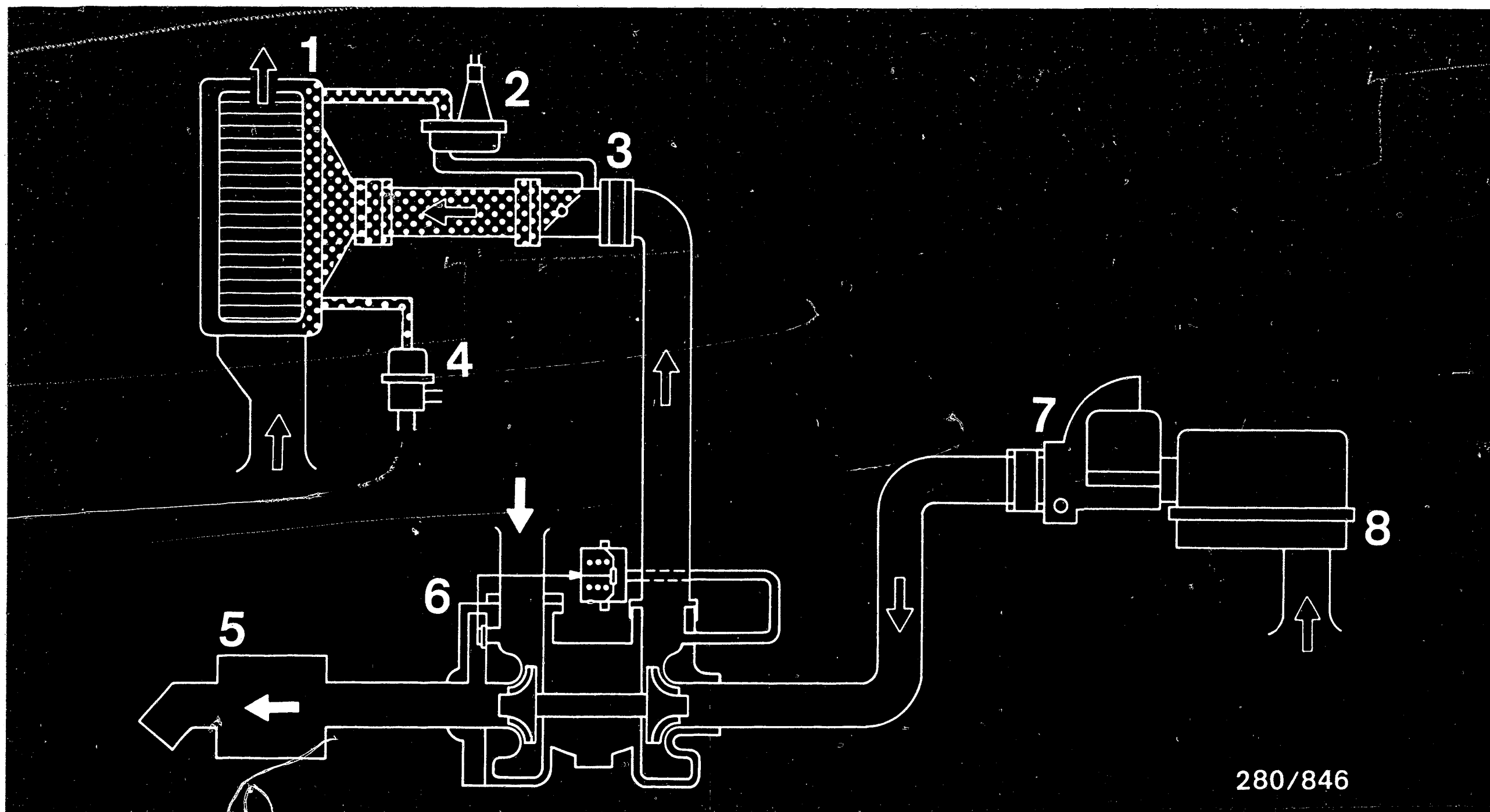




DIAGRAM OF AIR LINES

- | | |
|--------------------------|--------------------------------|
| 1 = Intercooler | 4 = Pressure regulator |
| 2 = Auxiliary-air device | 5 = Exhaust |
| 3 = Throttle valve | 6 = Exhaust turbo-supercharger |

- | |
|---------------------|
| 7 = Air-flow sensor |
| 8 = Air filter |

- | | |
|---|----------------------------|
|  | = Atmospheric pressure |
|  | = Intake-manifold pressure |

H10

Diagram of air lines
ALFA ROMEO



H11

Diagram of air lines
ALFA ROMEO



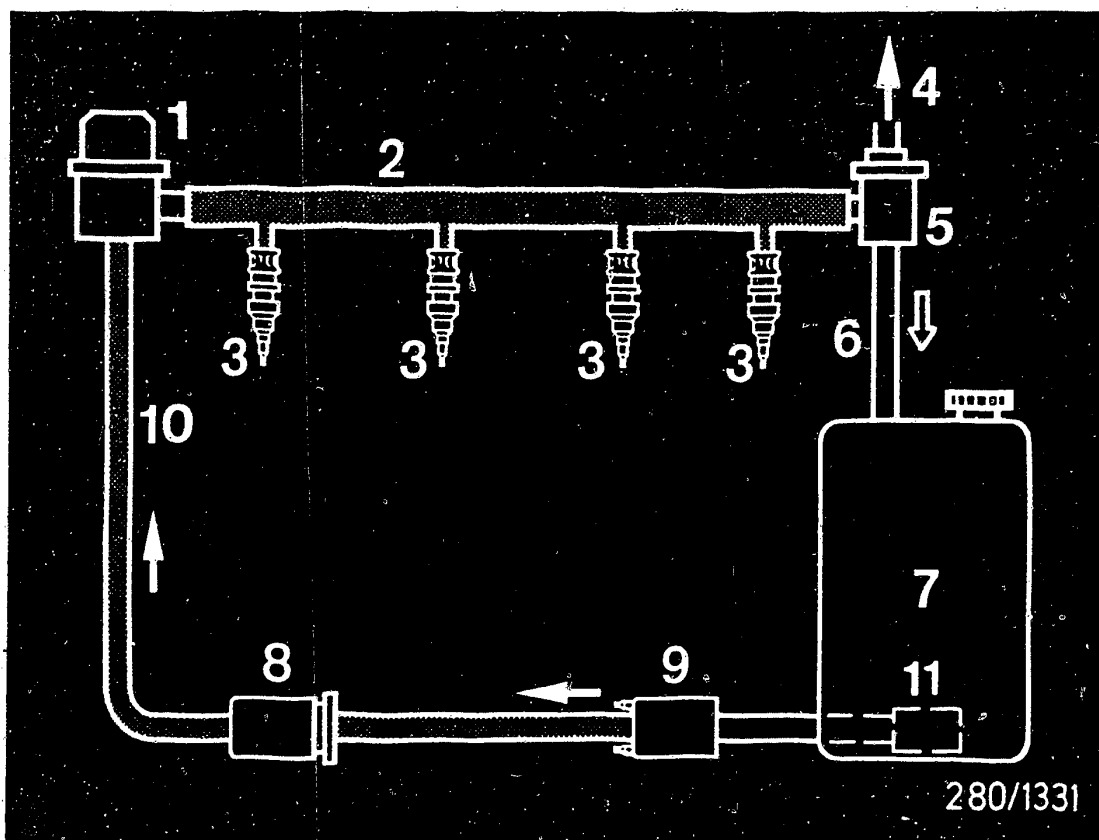


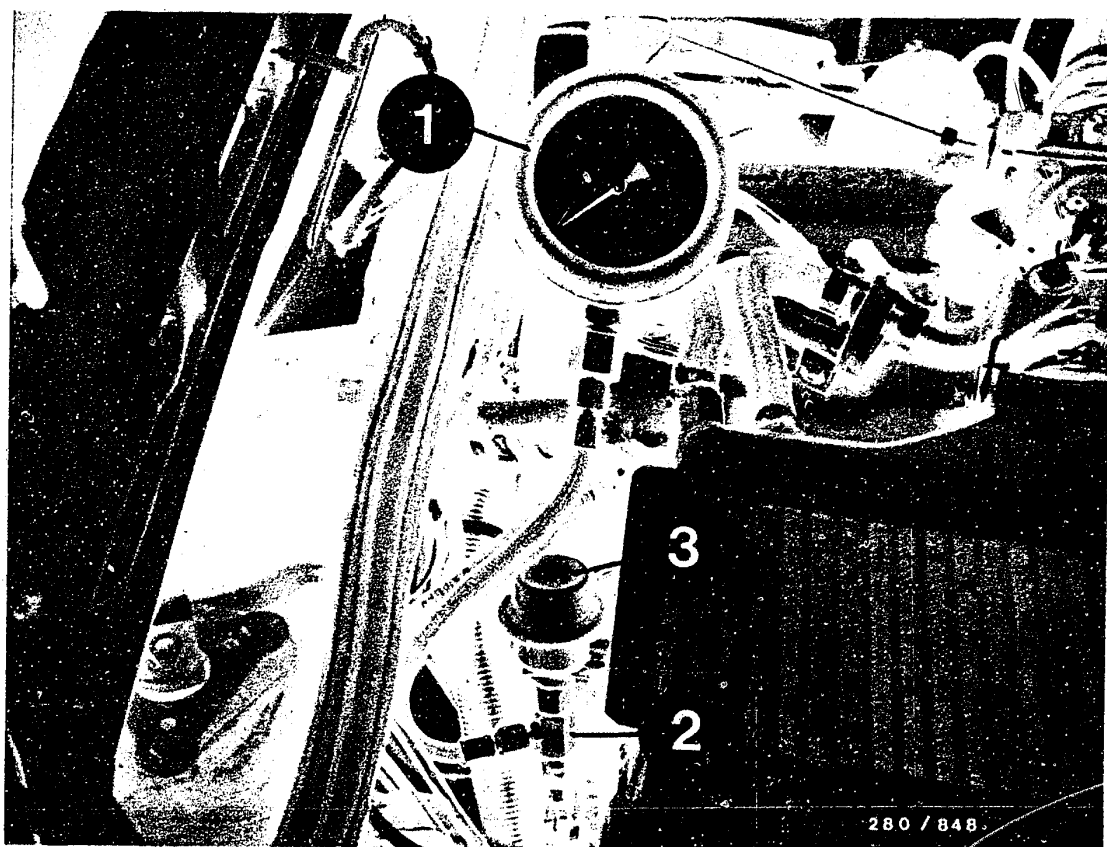
DIAGRAM OF FUEL LINES

— pressureless

▨ Fuel pressure

- 1 = Pressure damper
- 2 = Fuel distributor
- 3 = Solenoid-operated injection valves
- 4 = Intake-manifold pressure connection
- 5 = Pressure regulator
- 6 = Return line
- 7 = Fuel tank
- 8 = Fuel filter
- 9 = Electric fuel pump
- 10 = Fuel-injection tubing
- 11 = In-tank pre-supply pump





- 1 = Pressure gauge of pressure measuring instrument KDJE-P100
- 2 = Connecting piece KDJE-P100/14
- 3 = Pressure damper

FUEL PRESSURE TEST

Use pressure gauge and hose line of pressure tester KDJE-P 100 for the pressure test.

Connect connecting part KDJE-P100/14 in between at the fuel-distribution pipe inlet and connect hose line with pressure gauge at the lateral threaded fitting.

Caution: When opening the screw connection, make sure that no fuel gets onto hot parts of the engine.

INSTALLATION POSITION OF COMPONENTS

The EI-K control unit is positioned in the passenger compartment at the front on the right. See upper illustration.

Note on removal:

Pull the EI-K control-unit covering in the direction of the arrow (plug connection). See upper illustration.

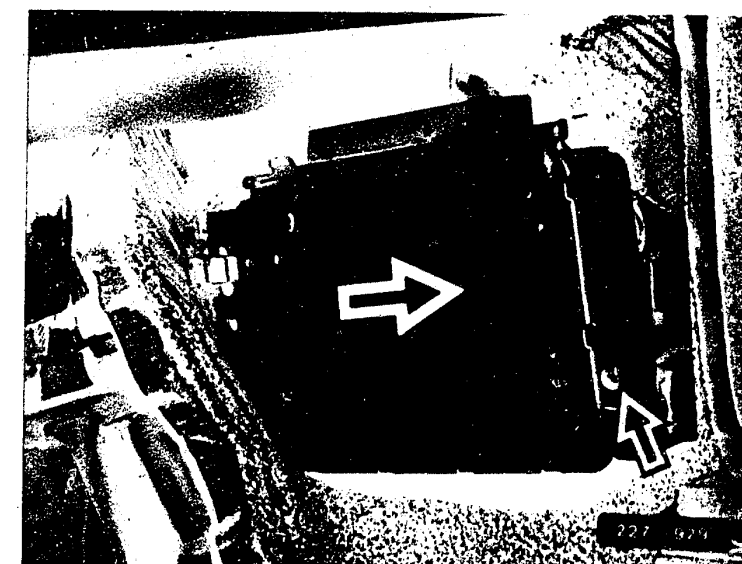
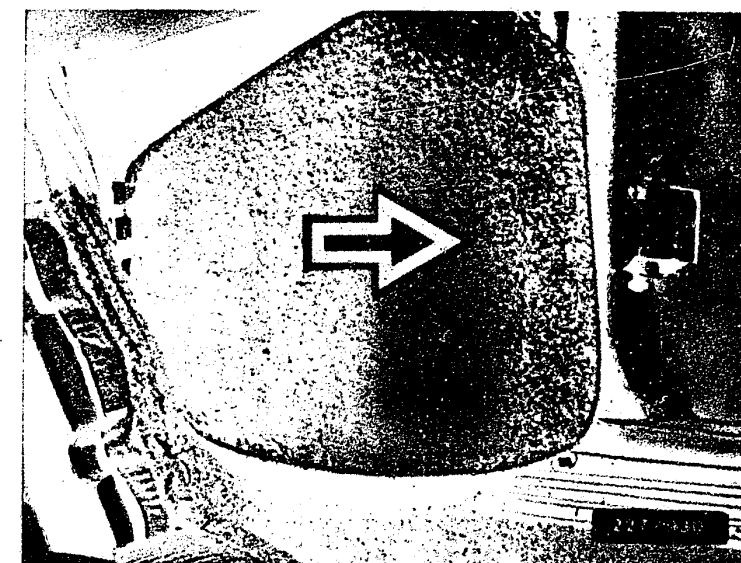
After unscrewing the fastening screw (center illustration - arrow), pull the EI-K control unit in the direction of the arrow (plug connection).

The LE-Jetronic control unit is positioned in the footwell on the passenger's side.

(Lower illustration - arrow).

Note on removal:

Pull back the floor matting. Unscrew the fastening screws (not illustrated) from the floor panel.



H14

Installation position of components

ALFA ROMEO

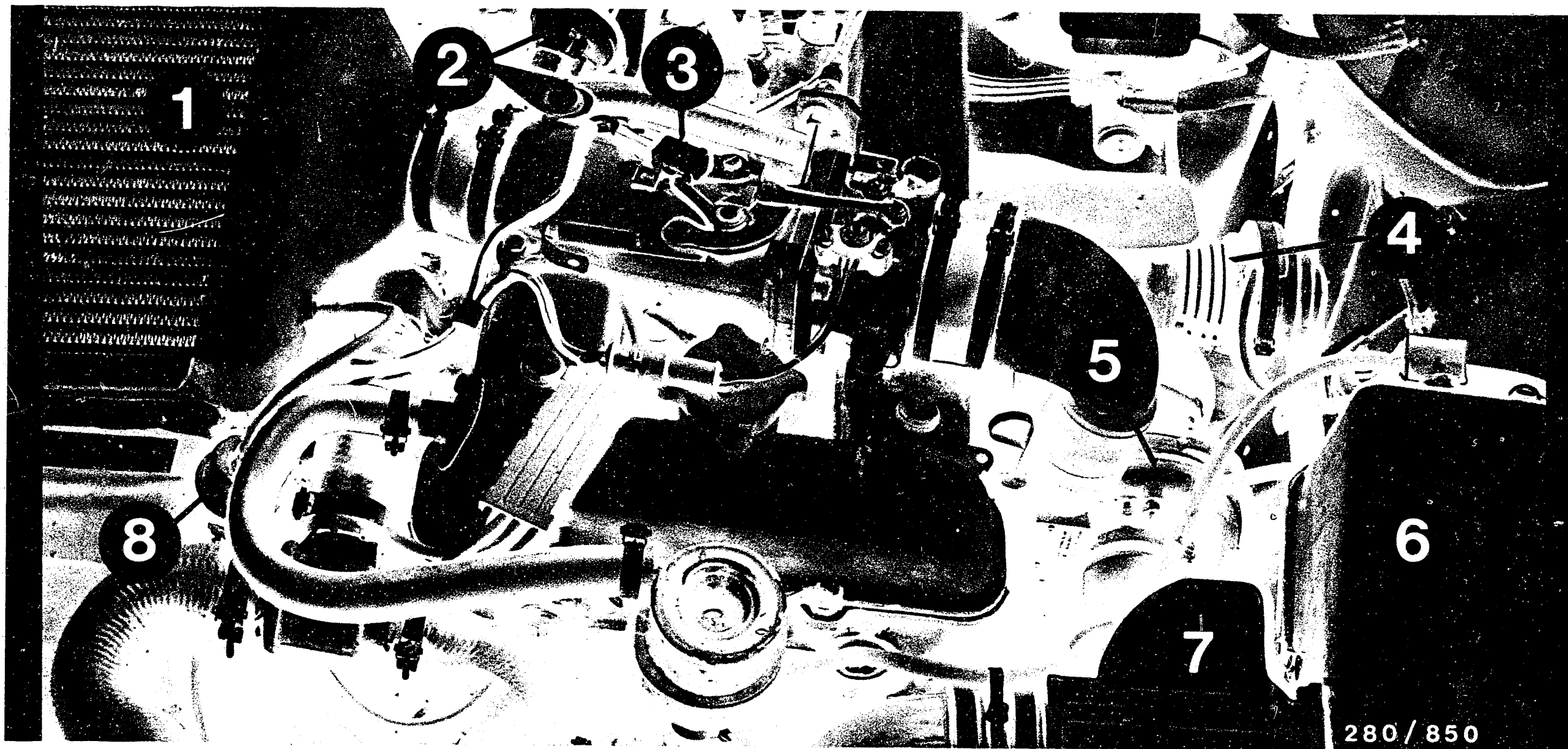


H15

Installation position of components

ALFA ROMEO





280/850

Installation position of components (continued)

- Layout of the components on the engine; plastic covering (not illustrated) removed from intake manifold
- | | |
|---|--------------------------------|
| 1 = Intercooler | 4 = Blow-off valve |
| 2 = Auxiliary-air device | 5 = Exhaust turbo-supercharger |
| 3 = Throttle-valve switch
(microswitch for idle information) | 6 = Air filter |
| | 7 = Air-flow sensor |
| | 8 = Pressure regulator |

H16

Installation position of components

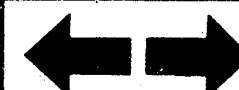
ALFA ROMEO

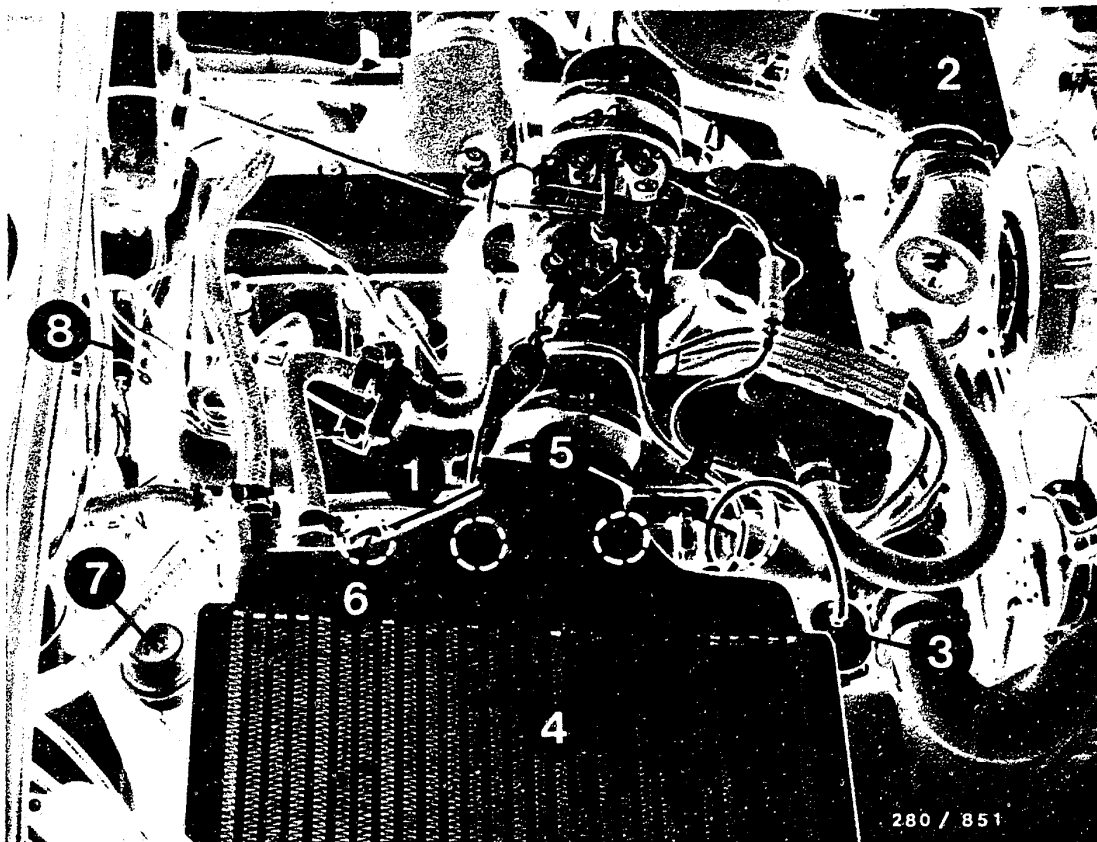


H17

Installation position of components

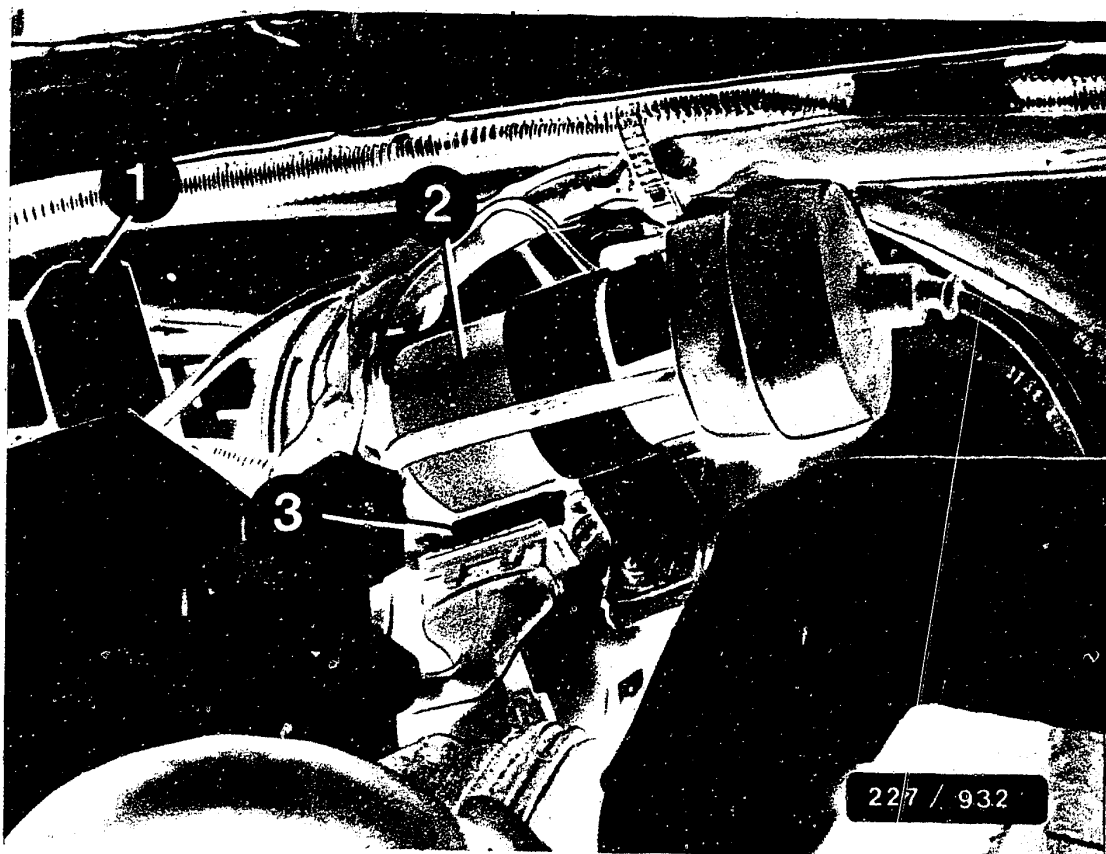
ALFA ROMEO





- 1 = Auxiliary-air device
- 2 = Air-flow sensor
- 3 = Pressure regulator
- 4 = Intercooler
- 5 = Solenoid-operated injection valves
- 6 = Temperature sensor (coolant)
- 7 = Pressure damper
- 8 = Series resistors





- 1 = Electric-fuel-pump relay
- 2 = Ignition coil
- 3 = Trigger box



- Ground cables

The electronics ground cable and output-stage ground cable of the control unit are bolted together with the auxiliary-air device on to the cylinder head.

Components of the fuel supply system:

- Electric fuel pump and fuel filter

Both components are secured on the underside of the vehicle, to the member on the right in front of the rear axle.

Access to the in-tank pre-supply pump may be gained via a central lock at the front of the fuel tank.



Table of contents FOR 504

<u>Section</u>	<u>Coordinates</u>
1. Special features	2
2. Test specifications	3
3. Rapid diagnostic chart	9
4. Electrical safety circuit	16
5. Diagram of fuel lines	19
6. General safety instructions	21
7. Installation position of the components	22

SPECIAL FEATURES

This microcard, valid at the time of publication, contains KE1-Jetronic trouble-shooting instructions for the following vehicle:

Ford Escort RS 1600 T (9.84 → 4.86)



1. Special features:

The structure and operation of the version KE 1 of the K-Jetronic system in the Ford Escort RS 1600 T corresponds to that of the basic model.

See W-400/000.

Scope of operation of the electronically controlled corrections:

- Warm-up enrichment
- Starting enrichment
- Post-start enrichment
- Acceleration enrichment
- Full-load enrichment
- Overrun cutoff

Special features of the engine:

- Exhaust gas turbocharger

Basic microfiche card for detailed trouble-shooting:
MB 501.

Important note:

When referring to a basic microfiche card, bear in mind that the test specifications must always be obtained from the brief instructions specific to the given vehicle.



2. Test specifications

Test step

Test specifications*

2.1 Electric fuel pump:

Fuel delivery

min. 1100 cm³/min.

2.2 Fuel pressures:

Primary pressure

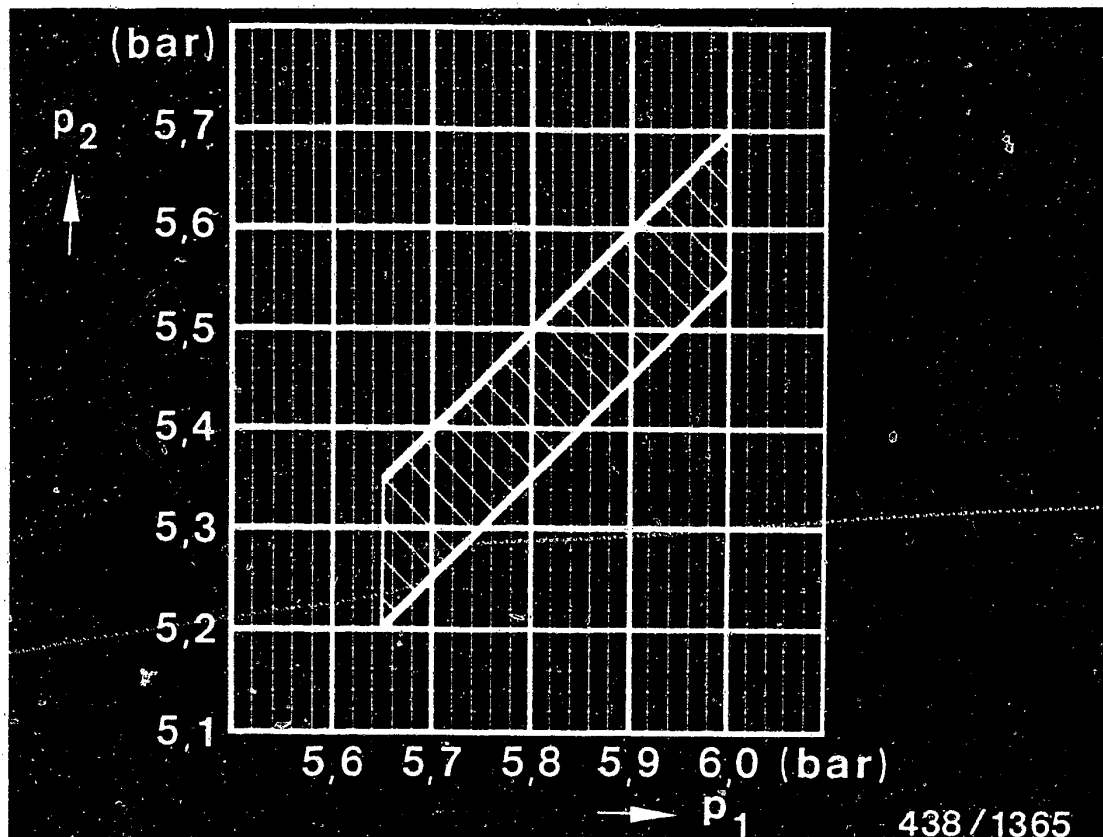
5.65...6.0 bar
(5.75...6.1 kgf/cm²)

* Pressures indicated in test specifications in bar (gauge pressure) or in kgf/cm² (gauge pressure).

J3

Test specifications
Ford Escort RS 1600 T





p_1 = Primary pressure

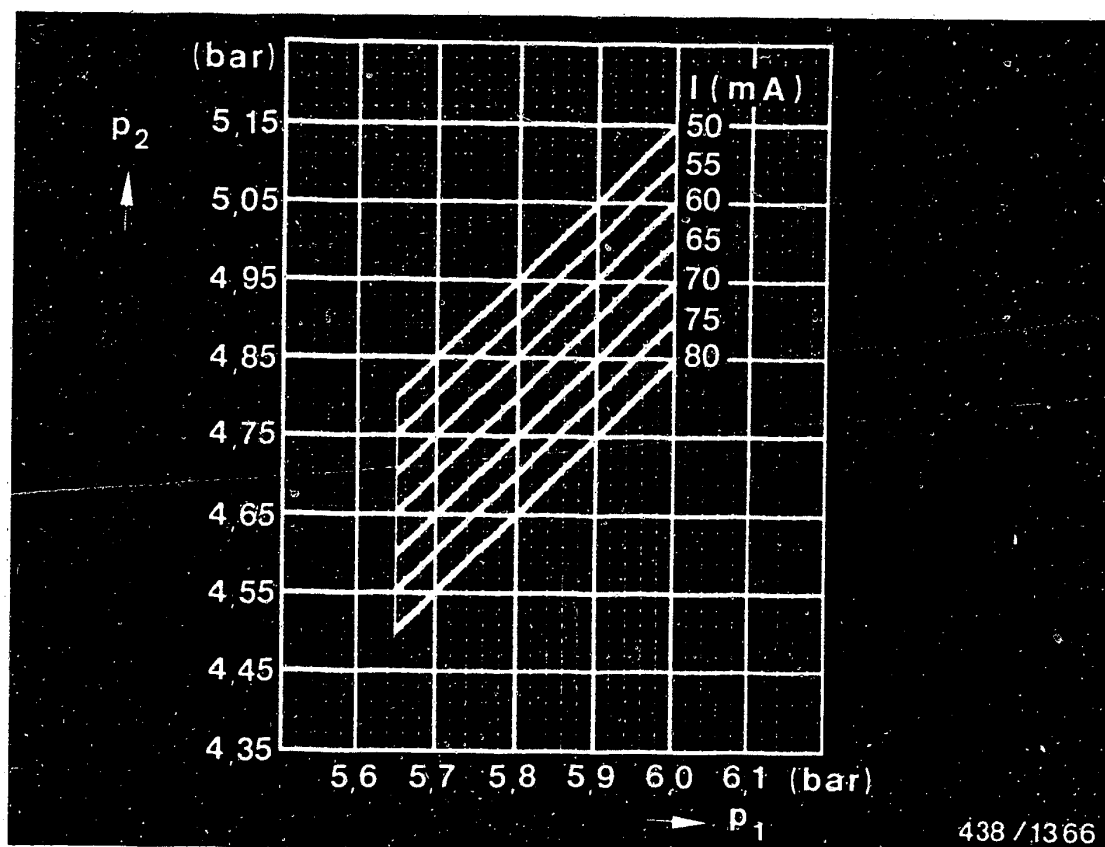
p_2 = Lower chamber pressure, actuator current = 0 mA

Differential pressure:

(Primary pressure/lower chamber pressure)

Obtain the specified value for the "warm" lower chamber pressure from the diagram in accordance with the primary pressure as measured.

The "warm" condition is simulated by disconnecting the plug for the lead on the pressure actuator (actuator current 0 mA).



p_1 = Primary pressure

p_2 = "Cold" lower chamber pressure. Tolerance ± 0.15 bar

I = Actuator current

Obtain the specified value for "cold" lower chamber pressure from the diagram in accordance with the primary pressure as measured and the actuator current as measured.

The "cold" condition is simulated by disconnecting the plug for the lead on the temperature sensor (NTC). Connect the plug for the lead on the pressure actuator.

Test stepTest specifications*2.3 Testing the fuel system as a whole for leaks:

Min. pressure after 10 min:	2.7 bar (2.8 kgf/cm ²)
after 20 min:	2.6 bar (2.7 kgf/cm ²)

2.4 Fuel-injection valves:

Opening pressure	3.0...4.1 bar (3.1...4.2 kgf/cm ²)
------------------	---

2.5 Checking the fuel distributor:

(Testing with pressure actuator attached.
No current in pressure actuator.)

Comparative
measurement of
fuel deliveries
from outlets:

Setting

Max. allowable
fuel delivery

Idle:	6.0 cm ³ /min	6.6 cm ³ /min
Part load:	40.0 cm ³ /min	42.5 cm ³ /min
Full load:	155.0 cm ³ /min	169.0 cm ³ /min

The full-load delivery for the
setting point must be attained
at a minimum at every outlet
with maximum deflection of the
air-flow sensor plate.

Flow through the KE-choke
in the fuel distributor: 130...145 cm³/min.

* Pressures indicated in test specifications in bar
(gauge pressure) or in kgf/cm² (gauge pressure).



Test stepTest specifications2.6 Temperature sensor

Measurements of resistance:

Engine cold. Ambient
temperature (+15°C...+30°C): 1300...3600 Ω

Engine at normal operating
temperature (approx. +80°C): 250...390 Ω

2.7 Thermotime switch

Measurements of resistance:

at a temperature	Measurement of resistance between		
	Term. "G" and ground (housing)	Term. "W" and ground (housing)	Term. "G" and Term. "W"
less than +30°C	25...40 Ω	0 Ω	25...40Ω
above + 40°C	50...80 Ω	100...160 Ω	50...80Ω

2.8 Air-flow sensor - Potentiometer:

Voltage signal with
air-flow sensor plate
in basic setting: 0.2...0.3 V

2.9 Auxiliary-air device:

Resistance of the heating
coil: 30 ... 65 Ω



Test stepTest specifications2.10 Idle adjustment:

Idle speed:

700...800 min⁻¹

Idle exhaust value (CO):

0.2...0.8 vol.%

J8

Test specifications

Ford Escort RS 1600 T



3. Rapid diagnostic chart for the Universal Test
Adapter ETT 018.01 with the KE-Jetronic test lead
1 684 463 135 and a suitable multimeter:

The rapid diagnostic chart below makes it possible for the experienced Jetronic expert to check quickly the electrical/electronic peripheral and control unit operations of the KE-Jetronic.





Important instructions for the rapid diagnostic chart
below:

The column "test conditions" shows those test steps at which the control unit plug must be connected and/or disconnected.

Make absolutely certain that the ignition is switched off every time the plug is plugged in or disconnected!



Rapid diagnostic chart for the Universal Test Adapter ETT 018.01

<u>Test step</u>	<u>Switch setting</u>		<u>Button</u>	<u>Object tested</u>	<u>Test connections</u>	<u>Test conditions</u>	<u>Test specifications (Reading)</u>
	V	Ω					
1		4	-	Pressure actuator Internal re- sistance	12 - 10	Disconnect control unit plug.	21 ... 30 Ω
2		5	-	Temperature sensor Internal re- sistance +15...+30°C approx. +80°C	21 - 2	Control unit plug disconnected.	1.3...3.6 k Ω 250...390 Ω
3		9	-	"Idle" throttle valve switch	13 - 6	Control unit plug disconnected. Throttle valve closed. Open throttle valve by hand	0 ... 10 Ω ∞ Ω
4		10	-	"Full load" Throttle valve switch	5 - 6	Control unit plug disconnected. Throttle valve closed. Throttle valve fully open.	∞ Ω 0 ... 10 Ω
5	4	-	-	Starting signal	24 - 2	Control unit plug disconnected. Activate starting motor.	8 ... 15 V
6	5	-	-	TD signal	25 - 2	Control unit plug disconnected. Activate starting motor for a few seconds.	V undefined.
7	6	-	-	Control unit Power supply	1 - 2	Control unit plug disconnected. Switch on ignition.	8 ... 15 V
8	7	-	-	Air-flow sensor potentiometer power supply	18 - 2	Switch off ignition. Connect control unit. Switch on ignition.	7.0 ... 8.0 V

J10

Rapid diag.chart f.Universal Test Adapter
Ford Escort RS 1600 T



J11

Rapid diag.chart f.Universal Test Adapter
Ford Escort RS 1600 T



Rapid diagnostic chart for the Universal Test Adapter ETT 018.01 (continued)

<u>Test step</u>	<u>Switch setting</u>		<u>Button</u>	<u>Object tested</u>	<u>Test connections</u>	<u>Test conditions</u>	<u>Test specifications</u>
	V	Ω					(Reading)
9	8	-	-	Air-flow sensor potentiometer signal	17 - 2	Control unit connected. Switch on ignition. Deflect air-flow sensor flap by hand. Voltage rises from 0 to max. 8.0 V	0 ... 8.0 V
10	9	-	-	Throttle-valve switch - power supply	6 - 2	Control unit connected. Switch on ignition.	7.0 ... 8.0 V
11	-	-	1	Warm-up enrichment, -20°C	12 - 12	Control unit connected. Switch on ignition.	30 ... 50 mA
12	-	-	2	Actuator current, corresponding to engine at normal operating temp.	12 - 12	Control unit connected. Switch on ignition.	0 ... 1 mA
13	-	-	2/4	Starting enrichment	12 - 12	Control unit connected. Switch on ignition. Continue pressing button 2. Triggering of starting enrichment (regardless of temperature) at beginning of start-up (TA 4). Switched off after approx. 1 sec.	110 ... 130mA
14	-	-	1/4	Post-start enrichment	12 - 12	Control unit connected. Switch on ignition. Continue pressing button 1. Triggering of post-start enrichment (dependent on temperature) at end of start-up (TA 4). Then slow cutback to warm-up value in test step 11. (30 ... 50 mA)	140 ... 160mA

J12

Rapid diag.chart f.Universal Test Adapter
Ford Escort RS 1600 T



J13

Rapid diag.chart f.Universal Test Adapter
Ford Escort RS 1600 T

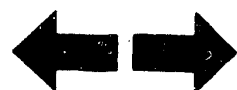


Rapid diagnostic chart for the Universal Test Adapter ETT 018.01 (continued)

Test step	Switch setting		Button	Object tested	Test connections	Test conditions	Test specifications
	V	Ω					(Reading)
15	-	-	1/6	Acceleration enrichment	12 - 12	Control unit connected. Switch on ignition. Continue pressing both buttons. Value for current corresponding to test specification in test step 11 (30...50 mA). Then deflect the air-flow sensor plate. Reading for current rises to test specification and cuts back very rapidly again (approx. 1 second).	80...120 mA
16	-	-	6	Full-load enrichment	12 - 12	Control unit connected. Switch on ignition:	7 ... 9 mA
17	-	-	2	Overrun cutoff	12 - 12	Control unit connected. Start the engine. Reverse the terminals on the ammeter (exchange positive and negative.) Increase engine speed to approx. 2000 min ⁻¹ while pressing on buttons. Then close the throttle valve. Reading for current goes to the test specification and switches at approx. 1500 min ⁻¹ to 0 ... 1 mA	> - 40 mA

J14

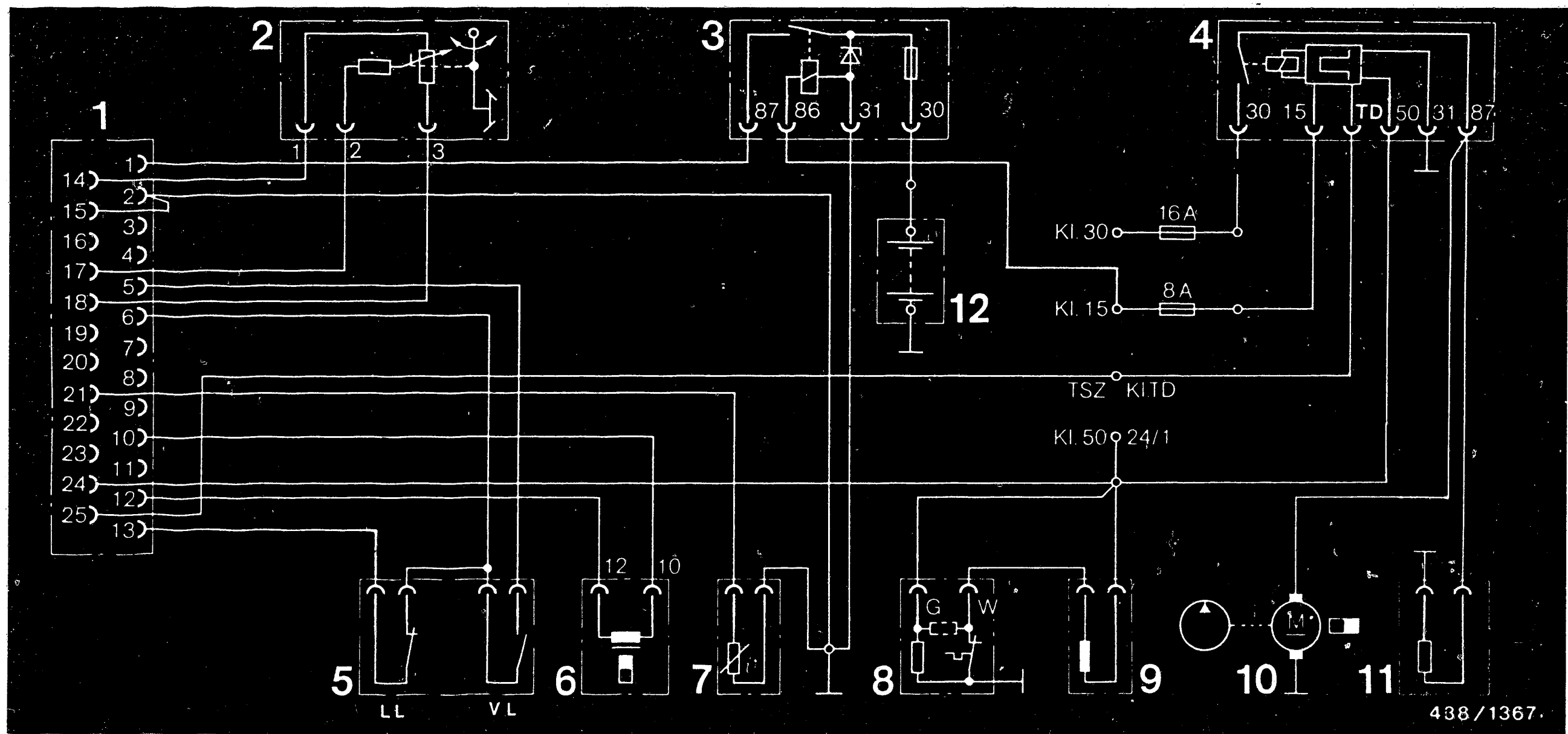
Rapid diag.chart f.Universal Test Adapter
Ford Escort RS 1600 T



J15

Rapid diag.chart f.Universal Test Adapter
Ford Escort RS 1600 T





438/1367.

4. Electrical safety circuit

4.1 Electrical connection diagram for the KE-Jetronic

- | | | |
|--|---|---------------------------|
| 1 = Electronic control unit | 5 = Idle, full load throttle valve switches | 9 = Start valve |
| 2 = Air-flow sensor-Potentiometer | 6 = Electrohydraulic pressure actuator | 10 = Electric fuel pump |
| 3 = Electronic relay with over-voltage protection | 7 = Temperature sensor (NTC) | 11 = Auxiliary-air device |
| 4 = Engine speed relay for safety circuit (pump relay) | 8 = Thermotime switch | 12 = Battery |
| | | Kl. = Term. |

J16

Electrical connection diagram
Ford Escort RS 1600 T



J17

Electrical connection diagram
Ford Escort RS 1600 T





- 1 = Electronic relay with over-voltage protection
 2 = Engine speed relay (pump relay)

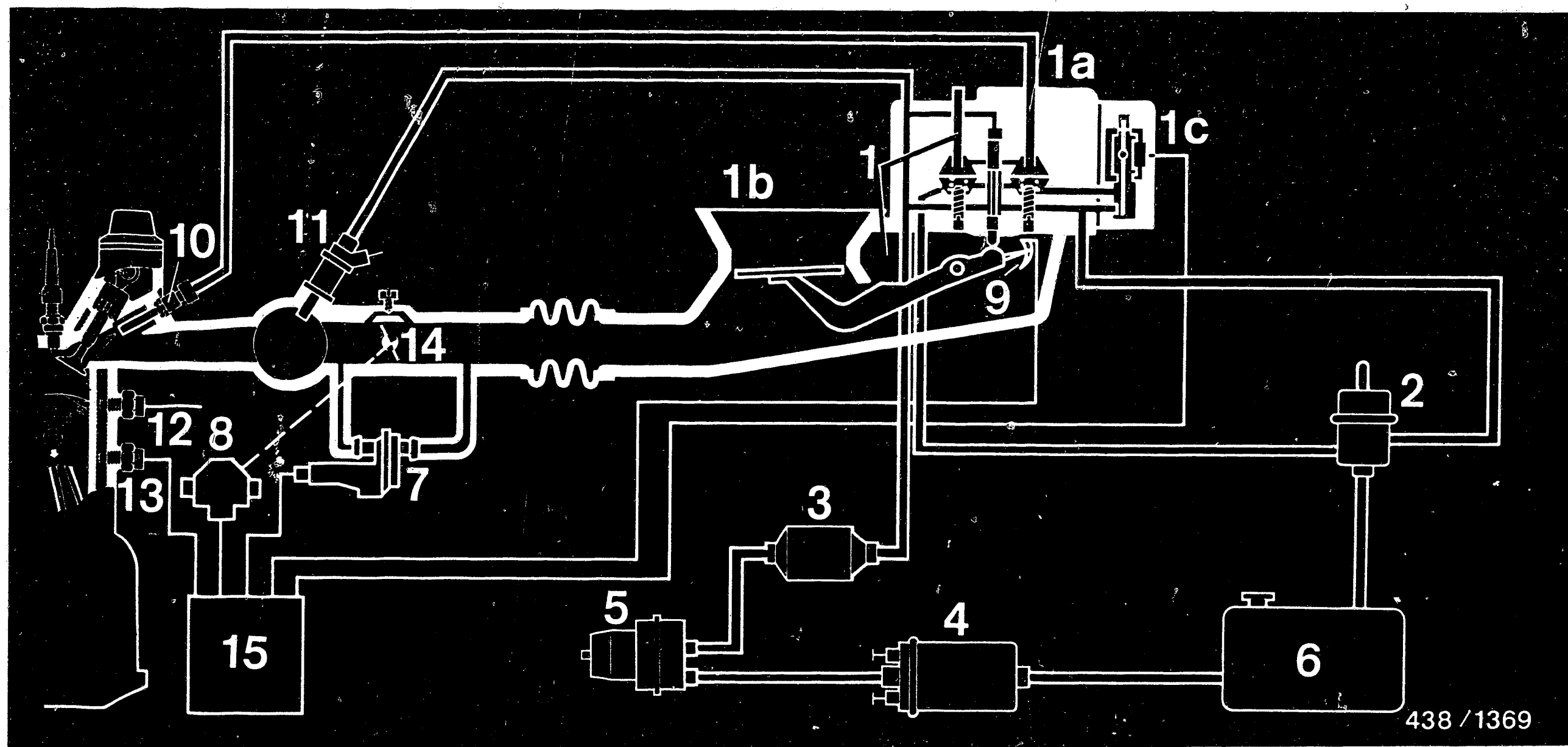
4.2 Jumping the electrical safety circuit:

The jump is made (for all measurements of pressure and fuel delivery) at the relay socket for the engine speed relay.

As regards vehicles manufactured in the first months of production, the engine-speed relay and over-voltage protection relay are located beneath the instrument panel on the driver's side (picture taken in an RHD vehicle).

In newer vehicles both relays are located in the central-electrics console (engine compartment, engine-speed relay marked "KE").





5. Diagram of fuel lines, KE-Jetronic

- | | | |
|---|--|-----------------------------------|
| 1 = Mixture-control unit | 3 = Fuel filter | 9 = Air-flow sensor potentiometer |
| 1a = Fuel distributor | 4 = Electric fuel pump | 10 = Fuel-injection valve |
| 1b = Air-flow sensor | 5 = Fuel accumulator | 11 = Start valve |
| 1c = Electrohydraulic pressure actuator | 6 = Fuel tank | 12 = Thermotime switch |
| 2 = Pressure regulator (primary pressure) | 7 = Auxiliary-air device | 13 = Temperature sensor (NTC) |
| | 8 = Full-load/idle throttle valve switches | 14 = Throttle valve |
| | | 15 = Control unit |

J19

Diagram of fuel lines

Ford Escort RS 1600 T



J20

Diagram of fuel lines

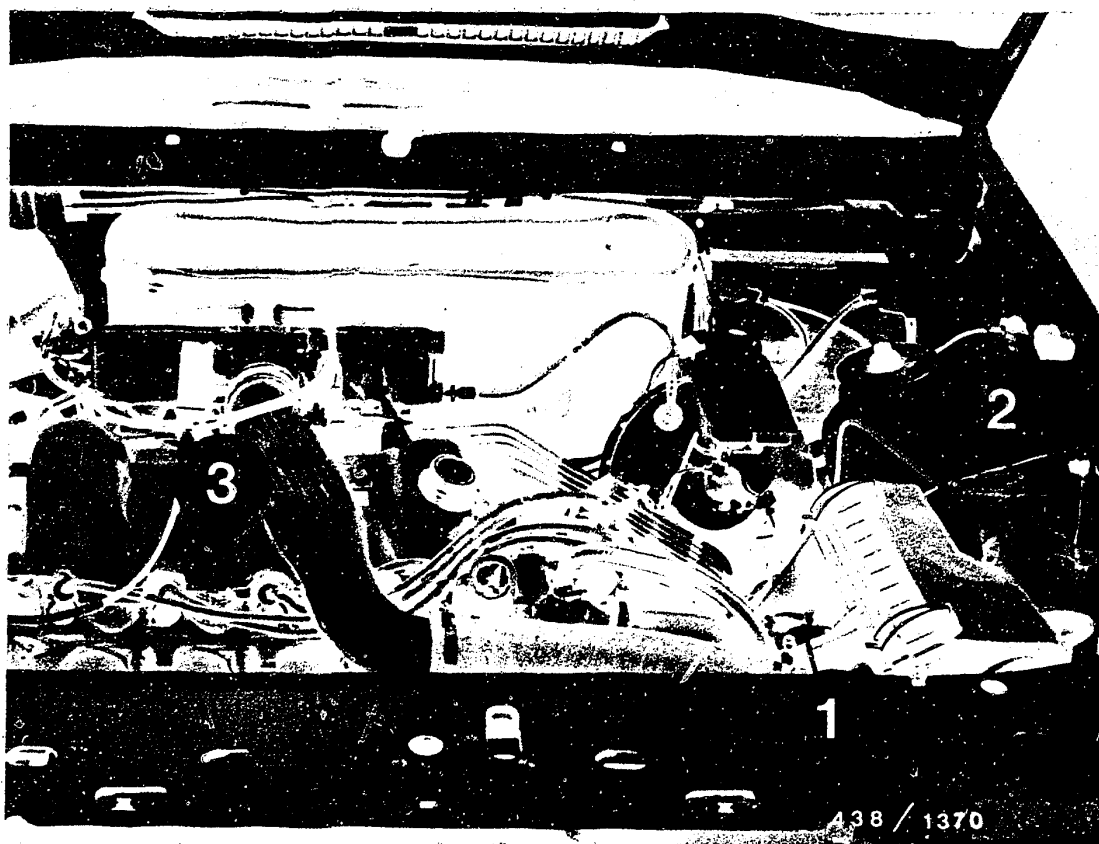
Ford Escort RS 1600 T



6. General safety instructions for working on vehicles with the KE-Jetronic

- When testing with the electric fuel pump running, never deflect the sensor plate in the air-flow sensor (press it down), because that causes fuel to be injected via the fuel-injection valves. In a subsequent starting of the engine, that can cause extremely serious engine damage.
- When testing the fuel-injection valves with the valve tester, follow the specifications for testing medium.
Never run the test with driving gasoline or other highly flammable fluids.
Even when using test gasoline, follow local safety regulations.
- Use only a permitted leak detector spray (e.g. Gypoflex) when testing the engine intake system for leaks. Do not use any highly flammable fluids.
Follow local safety regulations.
- Never start the engine without the battery being firmly connected.
- Never disconnect the battery from the vehicle electrical system while the engine is running.
- When quick-charging the battery, disconnect it from the vehicle electrical system.
- Remove the KE-Jetronic control unit at temperatures above +80°C (paint-drying ovens).
- Remove the KE-Jetronic control unit during electric welding jobs (e.g., spot welding).
- Make certain all wiring harness plugs are properly seated.
- Never disconnect or connect wiring harness plugs for the control unit while the ignition is switched on.





7. Installation position of the individual components

7.1 Arrangement of the components in the engine area:

- 1 - Mixture-control unit, primary pressure regulator, under the air filter housing.
- 2 - Fuel filter, on the inside fender on the left, behind the air filter.
- 3 - Throttle valve switch, on the throttle-valve assembly.

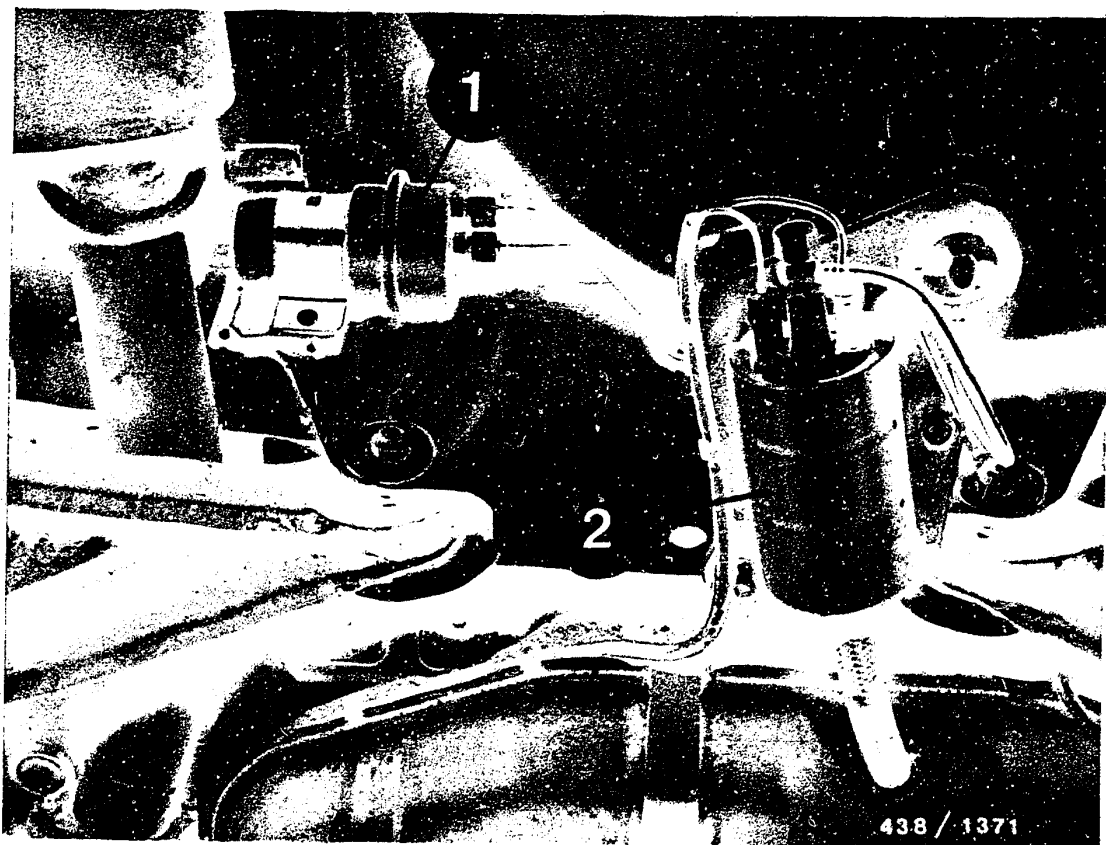
Fuel-injection valves, in the flanges of the individual intake tubes.

Auxiliary-air device, on the intake manifold.

Thermotime switch, temperature sensor (NTC), beneath intake manifold flanges 2 and 3 (accessible from under the vehicle).

Control unit, on the engine bulkhead, behind the heater housing.





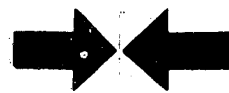
- 1 = Fuel accumulator
- 2 = Electric fuel pump

7.2 Components of the fuel supply system:

The electric fuel pump and the fuel accumulator are located on the lower side of the vehicle, in the area above the rear axle.



Section	Coordinates
1. Special features	2
2. Test specifications	3
3. Rapid diagnosis chart	7
4. Electric wiring diagram	20
5. Fuel line diagram	22



1. Special features

These brief SIS instructions apply to the following vehicle types:

Audi 4000 (USA)	7.84 →
VW Golf GTI (USA)	8.84 →

Engine: 4-cyl./1.8 l, 77 kW/105 PS. Longitudinal installation for Audi, transverse installation for VW.

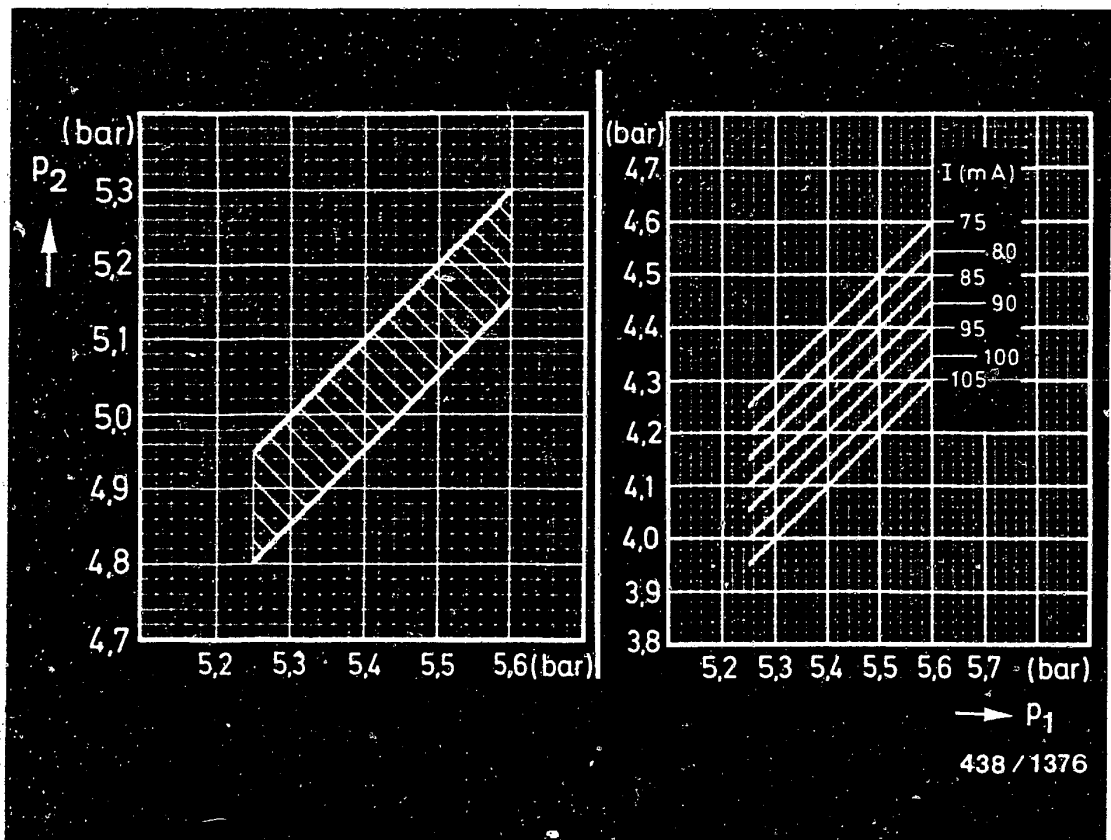
The KE-Jetronic system fitted to these models corresponds to the basic version with the following additional functions or special features:

- Lambda closed-loop control
- Idle speed control (electronic control circuitry incorporated in KE control unit)
- Fuel-injection valves with stationary air guide caps for air shrouding. (Note the special connection system for the tester for delivered quantity comparison.)

Basic microcard for detailed trouble-shooting:
PKW 097.

Important note: In the case of references to a basic microcard, it should be noted that the test specifications should always be taken from the brief instructions for the specific vehicle concerned.





p_1 = Primary pressure
 p_2 = Lower chamber pressure

2. Test specifications

2.1 Differential pressure:

(Primary pressure/lower chamber pressure)

Obtain the specified value for "warm" lower chamber pressure from the left-hand diagram to correspond to the primary pressure as measured. Actuator current 10 mA.

Obtain the specified value "cold" lower chamber pressure from the right-hand diagram to correspond to the primary pressure as measured and the actuator current as measured.

Note: Tolerance + 0.15 bar

The "cold" condition is simulated by disconnecting the cable plug at the temperature sensor (NTC).

K3

Test specifications

Audi/VW 4-cyl. USA 77 kW/105 PS



2.2 Electric fuel pump

Fuel delivery: min. 1000 cm³/min.

2.3 Primary pressure: 5.25 ... 5.6 bar
(5.35 ... 5.7 kgf/cm²)

2.4 Testing the fuel system as a whole for leaks:

Min. pressure after 10 min: 2.7 bar (2.8 kgf/cm²)

Min. pressure after 20 min: 2.6 bar (2.7 kgf/cm²)

2.5 Fuel-injection valves**

Opening pressure: 3.0 ... 4.1 bar
(3.1 ... 4.2 kgf/cm²)

2.6 Fuel distributor **

Comparative measurement of fuel deliveries:

Load range	Setting point	Max. allowable fuel delivery
Idle	6.0 cm ³ /min.	6.6 cm ³ /min.
Part load	40.0 cm ³ /min.	42.5 cm ³ /min.
Full load	91.0 cm ³ /min.	100.0 cm ³ /min.

Minimum delivery at all outlets with maximum deflection of air-flow sensor plate:

91.0 cm³/min.

Flow rate for KE throttle in fuel distributor:

130 ... 145 cm³/min.

** See next page!



**** Note on the part number for fuel-injection valves:**

The fuel injection valves installed in this engine have the part number 0 437 502 026 (original equipment) or ...027 (sales designation). These valves have an air-guide cap firmly pressed on (for the air shrouding system). For replacements, order valves with the above sales designation ...027 and not in accordance with the designation ..023 as stamped on the valve stem. Connection for the tester for comparison of fuel delivery using adapter sleeves KDJE-P 200/19.

2.7 Temperature sensor

Measurements of resistance:

Engine cold (+15°C...+30°C):	1300 ... 3600 Ω
Engine warm (approx. +80°C):	250 ... 390 Ω

2.8 Thermotime switch

Resistance measurements:

at a temperature	between		
	Term. G and ground	Term. W and ground	Term. G and Term. W
below +30°C	25...40 Ω	0 Ω	25...40 Ω
above +40°C	50...80 Ω	100...160 Ω	50...80 Ω

2.9 Air-flow sensor potentiometer

Voltage signal with
air-flow sensor plate
in basic position:

0.01 ... 0.05 V

2.10 Basic setting of idle-mixture-adjusting screw

(fuel-distributor seat -
needle bearing)

18.7 ... 18.9 mm



2.11 Idle adjustment *

Idle speed (regulated by idle speed control):	850 min ⁻¹
On/off ratio to be set (bypass screw):	28 \pm 1 %
Exhaust gas setting Pressure actuator trigger current.	
Checking value:	4 ... 16 mA
Setting:	9 ... 11 mA
CO level (check value):	0.3 ... 1.2 %

* Instructions for idle adjustment:

The exhaust gas setting is made automatically by the lambda closed-loop control. The object of the test is the triggering current for the pressure actuator in closed-loop control operation (pulsing of reading for current).

The setting should be adjusted to 9...11 mA by turning the idle-mixture-adjusting screw, but only if the reading lies outside the check value 4...16 mA. The CO check value is used to check whether or not there is a leak in the exhaust gas system. CO sampling at the exhaust-sample pipe on the right of the intake manifold. When checking the idle speed, switch off all electrical consuming devices and the air conditioner. The fan for the radiator must not be running. Disconnect the crankcase ventilation hose from the cylinder head cover and leave it open.



3. Rapid diagnostic chart for the universal test adapter
ETT 018.01 with KE-Jetronic test lead 1 684 463 135 and
a suitable multimeter:

The rapid diagnostic chart below makes it possible for the experienced Jetronic expert to check quickly the electrical/electronic peripheral and control unit functions of the KE-Jetronic, including the lambda closed-loop control.

Important instructions for the rapid diagnostic chart
below:

The column "test conditions" shows those test steps at which the control unit must be plugged in or disconnected. In this regard, make absolutely certain that there is no electricity in the system when plugging in or disconnecting, i.e. it is not permissible to jump the electrical safety circuit, and the ignition must be switched off.

The column "test connections" shows the cables incorporated in the relevant test path with reference to the allocations in the control unit cable plug. Any necessary trouble-shooting refers to these cables.



Rapid diagnostic chart for the universal test adapter ETT 018.01

Test step	Switch setting		But-ton	Object tested	Test connec-tions	Test conditions	Test specifi-cations (reading)
	V	Ω					
1	↓	4	-	Pressure actuator - internal resistance	12 - 10	Disconnect control unit plug.	12 ... 25 Ω
2	↓	5	-	Temperature sensor - internal resistance +15°C...+30°C approx. +80°C	21 - 2	Control unit plug disconnected.	1.3...3.6 k Ω 250...390 Ω
3	↓	11	-	Ground control unit - output stage	20 - 2	Control unit plug disconnected	0...10 Ω
4	↓	9	-	"Idle" throttle valve switch	13 - 2	N.B.: Measurement of voltage; connection for voltmeter: Negative = black socket "V" Positive = blue socket on left " Ω " Control unit plug disconnected. Switch on the ignition. Throttle valve closed: Open throttle valve by hand:	8 ... 15 V 0 V
5	↓	10	-	"Full load" throttle valve switch	5 - 2	N.B.: Measurement of voltage; connection for voltmeter: Negative = black socket "V" Positive = blue socket on left " Ω " Control unit plug disconnected. Switch on the ignition. Throttle valve closed: Throttle valve fully open:	0 V 8 ... 15 V

K8

Rapid diag. chart for univ. test adapter
Audi/VW 4-cyl. USA 77 kW/105 PS



K9

Rapid diag. chart for univ. test adapter
Audi/VW 4-cyl. USA 77 kW/105 PS



Rapid diagnostic chart for the universal test adapter ETT 018.01

Test step	Switch setting		But-ton	Object tested	Test connec-tions	Test conditions	Test specifi-cations (reading)
	V	Ω					
6	3	-	-	Signal, air conditioner (air conditioner ready)	16 - 2	Control unit plug disconnected. Switch on the ignition. Switch on the air conditioner.	8 ... 15 V
7	4	-	-	Starting signal Terminal 50 -	24 - 2	Control unit plug disconnected. Activate starting motor:	8 ... 15 V
8	5	-	-	TD signal (ignition)	25 - 2	Control unit plug disconnected. Activate starting motor for a few seconds:	Value for voltage undefined
9	6	-	-	Control unit - power supply	1 - 2	Control unit plug disconnected. Switch on the ignition.	8 ... 15 V
10	7	-	-	Power supply Potentiometer on air-flow sensor	18 - 2	Connect the control unit. Switch on the ignition.	7 ... 8 V
11	8	-	-	Signal poten-tiometer on the air-flow sensor	17 - 2	Control unit connected. Switch on the ignition. Deflect the air-flow sensor plate by hand, causing rise in voltage to max. 8 V.	0 ... 8 V

K10

Rapid diag. chart for univ. test adapter
Audi/VW 4-cyl. USA 77 kW/105 PS



K11

Rapid diag. chart for univ. test adapter
Audi/VW 4-cyl. USA 77 kW/105 PS



Rapid diagnostic chart for the universal test adapter ETT 018.01

Test step	Switch setting		But-ton	Object tested	Test connec-tions	Test conditions	Test specifi-cations (reading)
	V	Ω					
12	10	-	-	Idle actuator power supply and continuity, coil 1	3 - 2	Disconnect the control unit plug. Switch on ignition:	8 ... 15 V
13	11	-	-	Idle actuator - continuity, coil 2	4 - 2	Control unit plug disconnected. Switch on the ignition:	8 ... 15 V
14	12	-	-	Signal, air conditioner	19 - 2	Connect the control unit. Start the engine. Switch on the air conditioner. Air conditioner does not operate: Air conditioner operates at:	0 V 8 ... 15 V
15	14	24	-	Lambda control Closed-loop control operation	23 - 2	Control unit connected Short-circuit sockets 1 and 2 on test adapter. Start engine and warm it up. Control function: Pulsating voltage reading. Average value:	approx. 3 V
16	-	-	1	Warm-up enrichment	12 - 12	Measurement of current! Connection for tester: Negative = black socket 1 Positive = black socket 2 Control unit connected. Switch on the ignition:	51 ... 71 mA

K12

Rapid diag. chart for univ. test adapter
Audi/VW 4-cyl. USA 77 kW/105 PS



K13

Rapid diag. chart for univ. test adapter
Audi/VW 4-cyl. USA 77 kW/105 PS

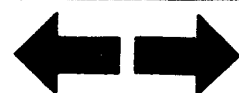


Rapid diagnostic chart for the universal test adapter ETT 018.01

Test step	Switch setting		But-ton	Object tested	Test connec-tions	Test conditions	Test specifi-cations (reading)
	V	Ω					
17	-	21	2	Actuator current corresponding to engine at normal operating temperature	12 - 12	Control unit connected. Switch on the ignition:	9 ... 11 mA
18	-	21	1/4	Post-start enrichment	12 - 12	Control unit connected. Switch on the ignition. Hold down button 1: Briefly press push-button 4 and release. Current increases to: After a brief time, cuts back to: Cutback time approx. 90 seconds.	51... 71 mA 130...150 mA 51... 71 mA
19	-	21	1/6	Acceleration enrichment	12 - 12	Control unit connected. Switch on the ignition. Hold down both buttons. Value for current: Deflect the air-flow sensor plate sharply. Current rises to: Cuts back in approx. 1 second to:	51... 71 mA 130...150 mA 51... 71 mA

K14

Rapid diag. chart for univ. test adapter
Audi/VW 4-cyl. USA 77 kW/105 PS



K15

Rapid diag. chart for univ. test adapter
Audi/VW 4-cyl. USA 77 kW/105 PS

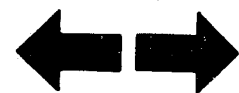


Rapid diagnostic chart for the universal test adapter ETT 018.01

Test step	Switch setting		But-ton	Object tested	Test connec-tions	Test conditions	Test speci-fi-cations (reading)
	V	Ω					
20	-	21	2	Overrun cutoff	12 - 12	Control unit connected. Reverse terminals on ammeter (interchange positive and negative). Start the engine and hold at $1800 \dots 2000 \text{ min}^{-1}$. While pressing button 2, activate the idle throttle valve switch by hand. The engine hunts. Reading for current during speed-drop phases: There must not be any overrun cutoff when the cruise control is switched on.	40...50 mA
21	-	21	-	Full-load enrichment	12 - 12	Control unit connected. Connect up ammeter normally (1-, 2+). Start the engine and hold at 4000 min^{-1} . Activate the full-load throttle valve switch:	12...16 mA
22	-	24	-	Lambda closed-loop control	12 - 12 8 - 12	Control unit connected. Start the engine, warm it up and operate it at idle speed. Closed-loop control operation of the lambda control can be identified from the pulsing of the reading for current. Average value: If average value is not within tolerance, make adjustment (idle-mixture-adjusting screw) to:	4 ... 16 mA 9 ... 11 mA
23	-	22	-	Lambda closed-loop control - Rich stop	12 - 12 8 - 2	Control unit connected. Switch on the ignition: Current rises to:	max. 22 mA

K16

Rapid diag. chart for univ. test adapter
Audi/VW 4-cyl. USA 77 kW/105 PS



K17

Rapid diag. chart for univ. test adapter
Audi/VW 4-cyl. USA 77 kW/105 PS



Rapid diagnostic chart for the universal test adapter ETT 018.01

Test step	Switch setting		But-ton	Object tested	Test connec-tions	Test conditions	Test specifi-cations (reading)
	V	Ω					
24		23	-	Lambda closed-loop control - lean stop	12 - 12 8 - 2	Control unit connected. Switch on the ignition: Current drops to:	less than 2 mA
25	10	24	-	Idle speed control		Testing with lambda closed-loop control tester KDJE-P 600. Press buton "IR". Jump black sockets 1 and 2 on the test adapter. Bring engine to normal operating temperature and run it at idle. Idle speed (set by control): On/off ratio: If need be, adjust the on/off ratio (bypass screw on the throttle valve assembly).	800-900 min ⁻¹ 28 \pm 1 %
26	10	24	see text	Idle speed control - correction functions		Press button 6 (corresponds to opening of the idle throttle valve switch). On/off ratio:	34 - 38 %
						Switch on the air conditioner (compressor). Speed:	850-950 min ⁻¹
						Engine speed boost, engine cold. (Testing only with engine cold.) Engine temperature less than +25°C +25°C - +40°C	950-1050min ⁻¹ 850- 950min ⁻¹

K18

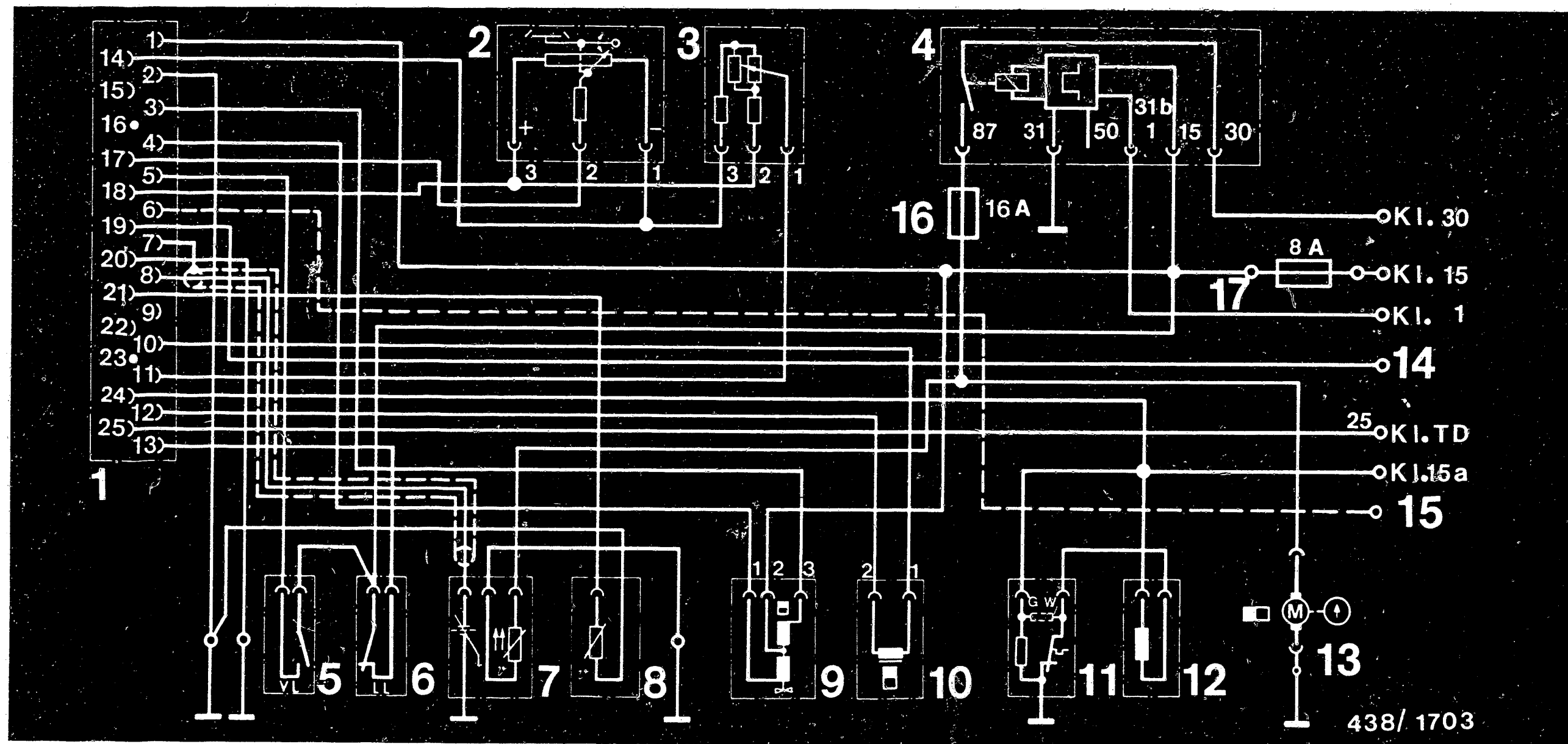
Rapid diag. chart for univ. test adapter
Audi/VW 4-cyl. USA 77 kW/105 PS



K19

Rapid diag. chart for univ. test adapter
Audi/VW 4-cyl. USA 77 kW/105 PS





4. Electrical wiring diagram for the KE-Jetronic with safety circuit

- | | |
|---------------------------------------|------------------------------------|
| 1 = Control unit | 10 = Pressure actuator |
| 2 = Air-flow sensor potentiometer | 11 = Thermotime switch |
| 3 = Pressure sensor (altitude sensor) | 12 = Cold-start valve |
| 4 = Electronic speed relay | 13 = Electric fuel pump |
| 5 = Full-load throttle valve switch | 14 = Cable for air conditioner |
| 6 = Idle throttle valve switch | 15 = Connection for cruise control |
| 7 = Lambda sensor with sensor heater | 16 = Central-electric, fuse no. 13 |
| 8 = Temperature sensor (NTC) | 17 = Central-electric, fuse no. 24 |
| 9 = Idle actuator | |

Jumping the electrical safety circuit for pressure measurements:
Disconnect the speed relay (4) from the relay base and jump the terminals 30 and 87 with an auxiliary lead.
Important: It is necessary for the electric fuel pump to operate only for pressure measurements. For electrical tests, only switch on the ignition.

K20

Electrical wiring diagram

Audi/VW 4-cyl. USA 77 kW/105 PS



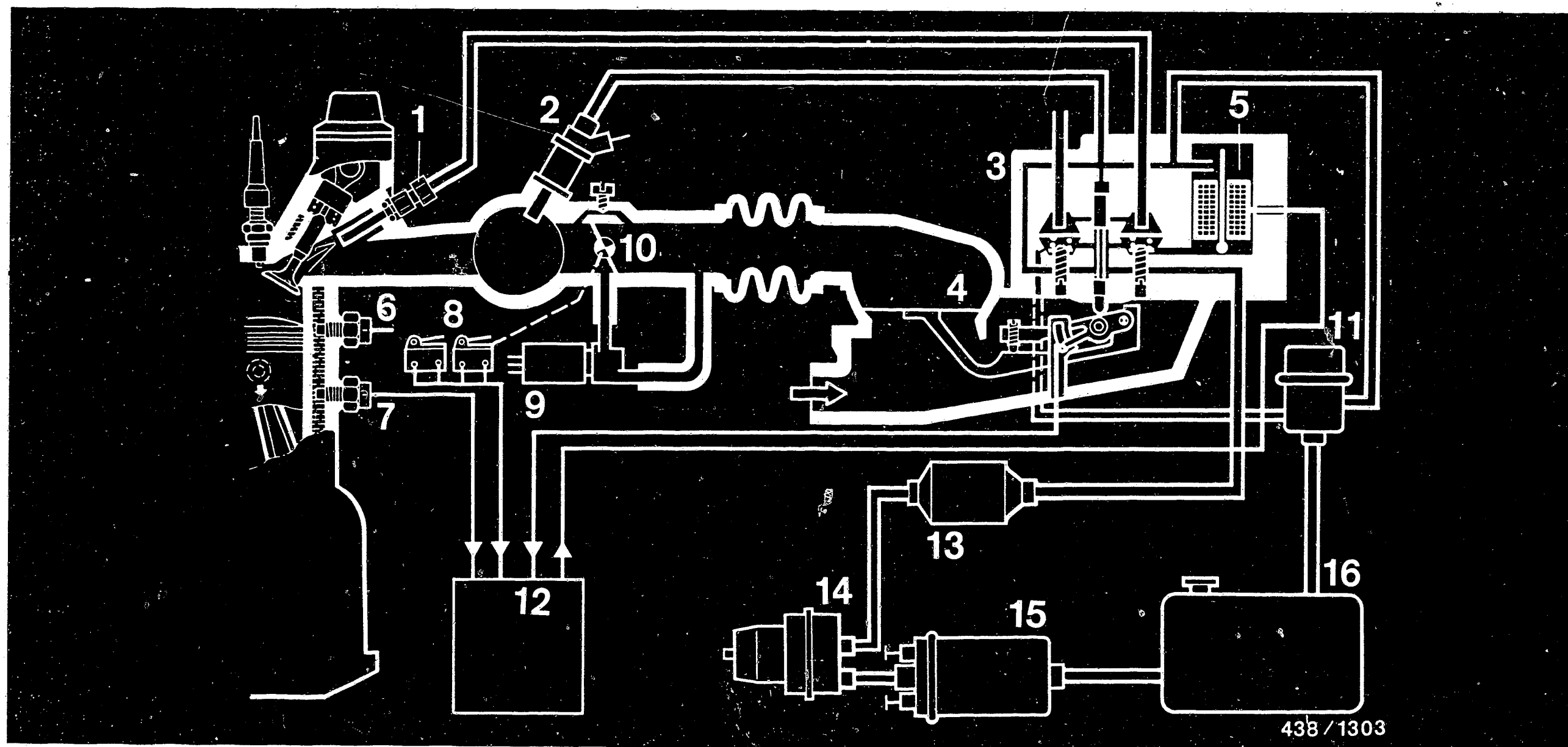
K21

Electrical wiring diagram

Audi/VW 4-cyl. USA 77 kW/105 PS



438/ 1703



5. Fuel line diagram and air paths for the KE-Jetronic

- 1 = Fuel-injection valve
- 2 = Cold-start valve
- 3 = Fuel distributor
- 4 = Air-flow sensor
- 5 = Electrohydraulic pressure actuator
- 6 = Thermotime switch

- 7 = Temperature sensor (NTC)
- 8 = Idle, full-load throttle valve switches
- 9 = Idle actuator
- 10 = Throttle valve
- 11 = Pressure-regulator (primary pressure)

- 12 = Control unit
- 13 = Fuel filter
- 14 = Fuel accumulator
- 15 = Electric fuel pump
- 16 = Fuel tank

K22

Diagram of fuel lines, air paths
Audi/VW 4-cyl. USA 77 kW/105 PS



K23

Diagram of fuel lines, air paths
Audi/VW 4-cyl. USA 77 kW/105 PS



6. Installation position of components

6.1 Installation position for Audi (longitudinal installation):

Mixture-control unit, primary pressure regulator: On inner right-hand fender.
Cold-start valve: On intake manifold next to throttle-valve assembly.
Throttle valve switch: On throttle-valve assembly, idle at bottom, full load at top.
Fuel-injection valves: On intake tube flanges.
Idle actuator: Above cylinder head, in vicinity of throttle-valve assembly
Thermotime switch, temperature sensor: In coolant fitting, on left of engine.
Control unit: Mounted on right of glove compartment, and accessible only after removal of glove compartment.
Electric fuel pump, fuel accumulator and fuel filter: The fuel supply components are mounted on the underside of the vehicle in the area in front of the rear axle.

6.2 Installation position for VW (transverse installation)

Mixture-control unit, primary-pressure regulator: On left of engine compartment.
Cold-start valve: In intake manifold, opposite throttle-valve assembly
Throttle valve switch: On throttle-valve assembly, idle at bottom, full load at top.
Fuel-injection valves: On intake tube flange;.
Idle-actuator: In bypass line on throttle-valve assembly.
Thermoswitch, temperature sensor: In coolant fitting at front of engine.
Fuel filter: Next to mixture-control unit.
Electric fuel pump with pressure-side damper: Directly flange-mounted on fuel tank.
Fuel accumulator: Above the rear axle.



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Installation position of components	17

SPECIAL FEATURES

This microcard, valid at the time of publication, contains L-Jetronic trouble-shooting instructions for the following vehicles:

Alfa Romeo GTV 6/2.5 EU (10.80 -)
 Alfa Romeo 90 2.5 6V inizione (11.84 -)
 Alfa Romeo 75 2.5 6V inizione (5.85 -)

L1

Table of contents/special features

Alfa Romeo GTV 6, 75, 90



Special features (continued)

- L-Jetronic with 35-pole control unit 0 280 001 117 actuated by term. 1 of ignition coil. 7-pole air-flow sensor and 13-pole relay combination.
- Safety switch (Alfa GTV model only) in engine compartment.
- In-tank pre-supply pump on Alfa 90 and Alfa 75 models.

Note:

The L-Jetronic in these Alfa models essentially corresponds to that of the Opel 2.5 1/3.0 1/6 cylinder.

- Similar SIS repair instructions:
SIS Microcard OPE-501

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

- Universal test adapter 0 684 101 801 and
- adapter lead 1 684 463 129

The following rapid diagnosis chart makes it possible for experienced L-Jetronic specialists to check the electrical components of the system rapidly using the universal test adapter.

The rapid diagnosis chart contains the following information:

- Sequence of test steps
- Position of V- and Ω -program selector switch
- Information on operation of universal test adapter or other components.
- Test specifications for engine tester and multi-meter



Rapid diagnosis chart for universal test adapter - Testing of L-Jetronic with adapter lead 1 684 463 129

Test step	Switch position		Measurement	Control-unit plug between terminal	Remarks	Test specifications (reading)
	V	Ω				
1	3	-	Voltage from starting motor term. 50.	4 and 5	Shift gear to neutral, operate starting motor	<u>8 ... 15 V</u>
2	4	-	Voltage from relay set term. 88 c.	34 and 5	Shift gear to neutral, operate starting motor	<u>8 ... 15 V</u>
3	5	-	Voltage pulses from ignition coil term. 1.	1 and 5	Shift gear to neutral, operate starting motor	Ignition pulses on oscilloscope
4	6	-	Voltage from relay set term. 88 a. Control-unit plug term. 10 to term. 5.	10 and 5	Ignition "ON".	<u>8 ... 15 V</u>
5	7	-	Voltage from 1st injection valve term. 15.	15 and 5	Ignition "ON".	<u>8 ... 15 V</u>
6	8	-	Voltage from 2nd injection valve term. 33.	33 and 5	Ignition "ON".	<u>8 ... 15 V</u>
7	9	-	Voltage from 3rd injection valve term. 32.	32 and 5	Ignition "ON".	<u>8 ... 15 V</u>
8	10	-	Voltage from 4th injection valve term. 14.	14 and 5	Ignition "ON".	<u>8 ... 15 V</u>
9	11	-	Voltage through pump contact in air-flow sensor from relay set term. 86 b.	20 and 5	Ignition "ON". Deflect sensor flap	<u>8 ... 15 V</u>
10	12	-	Voltage from relay set term. 88 b.	29 and 5	Ignition "ON".	<u>8 ... 15 V</u>
11	13	-	Voltage from 5th injection valve term. 30.	30 and 5	Ignition "ON".	<u>8 ... 15 V</u>
12	14	-	Voltage from 6th injection valve term. 31.	31 and 5	Ignition "ON".	<u>8 ... 15 V</u>

L3

Rapid diag. chart for uni. test adapter
Alfa Romeo GTV 6, 75, 90



L4

Rapid diag. chart for uni. test adapter
Alfa Romeo GTV 6, 75, 90



Rapid diagnosis chart for universal test adapter
Testing of L-Jetronic with adapter lead 1 684 463 129

Test step	Switch position		Measurement	Control unit plug between terminal	Remarks	Test specifications (Readings)
	V	Ω				
13	↓	6	Resistance of potentiometer (wiper in air-flow sensor term. 7).	7 and 5	Deflect sensor flap as far as it will go.	<u>80 ... 600 Ω</u>
14	↓	7	Resistance of potentiometer (overall resistance in air-flow sensor term. 8).	8 and 5	----	<u>260 ... 520 Ω</u>
15	↓	8	Series resistance and potentiometer (overall resistance in air-flow sensor term. 9)	9 and 5	----	<u>400 ... 800 Ω</u>
16	↓	9	Resistance of idle contact in throttle-valve switch term. 2.	2 and 18	Acc.pedal in off-position:	<u>0 ... 10 Ω</u>
					Depress acc.pedal somewhat	<u>∞ Ω</u>
17	↓	10	Resistance of full-load contact in throttle-valve switch term. 3.	3 and 18	Fully depress acc. pedal (full-throttle position)	<u>0 ... 10 Ω</u>
					Acc.pedal in off-position:	<u>∞ Ω</u>
18	↓	11	Resistance of temperature sensor NTC I in air-flow sensor term. 27	27 and 5	----	at +15°C...+30°C: <u>1.45...3.3kΩ</u> at +80°C: <u>280...360Ω</u>
19	↓	12	Resistance of temperature sensor NTC II term. 13 (engine temperature).	13 and 5	----	at +15°C...+30°C: <u>1.3...3.6kΩ</u> at +80°C: <u>250...390Ω</u>
20	↓	13	Resistance, ground-output stage term. 16.	16 and 5	---	<u>0 ... 10 Ω</u>
21	↓	14	Resistance, ground-output stage term 17.	17 and 5	---	<u>0 ... 10 Ω</u>
22	↓	15	Resistance, ground-output stage term. 35.	35 and 5	---	<u>0 ... 10 Ω</u>

L5

Rapid diag. chart for uni. test adapter
 Alfa Romeo GTV 6, 75, 90



L6

Rapid diag. chart for uni. test adapter
 Alfa Romeo GTV 6, 75, 90



TEST SPECIFICATIONS

Air-flow sensor

- Resistance between term. 7 and term. 8
(Deflect sensor flap
in the process): 200 ... 1000 Ω

Relay combination

- Resistance measurement between
term. 86b (positive terminal
of ohmmeter) and term. 85: 70 ... 500 Ω

Auxiliary-air device

- Internal resistance 25 ... 60 Ω

Idle setting, engine at operating temperature, approx. +80°C

- Idle speed:
Manual and automatic trans-
mission: 800 ... 1000 min⁻¹
- CO content: 0.5...1.5 vol. %

Pressure regulator

- Fuel pressure: 2.3 ... 2.7 bar

Electric fuel pump

- Delivery at return: at least 800 cm³ / 30s
- Supply voltage under load: at least 12 V



TEST SPECIFICATIONS (continuation)

Solenoid-operated injection valve

- Internal resistance at +20°C 2 ... 3 Ω

Temperature sensor

● Internal resistance with	NTC I	NTC II
Ambient temperature (+15°C...+30°C):	1.45...3.3k Ω	1.30...3.6k Ω
Engine at operating temp. (approx. +80°C):	280 ...360 Ω	250 ...390 Ω

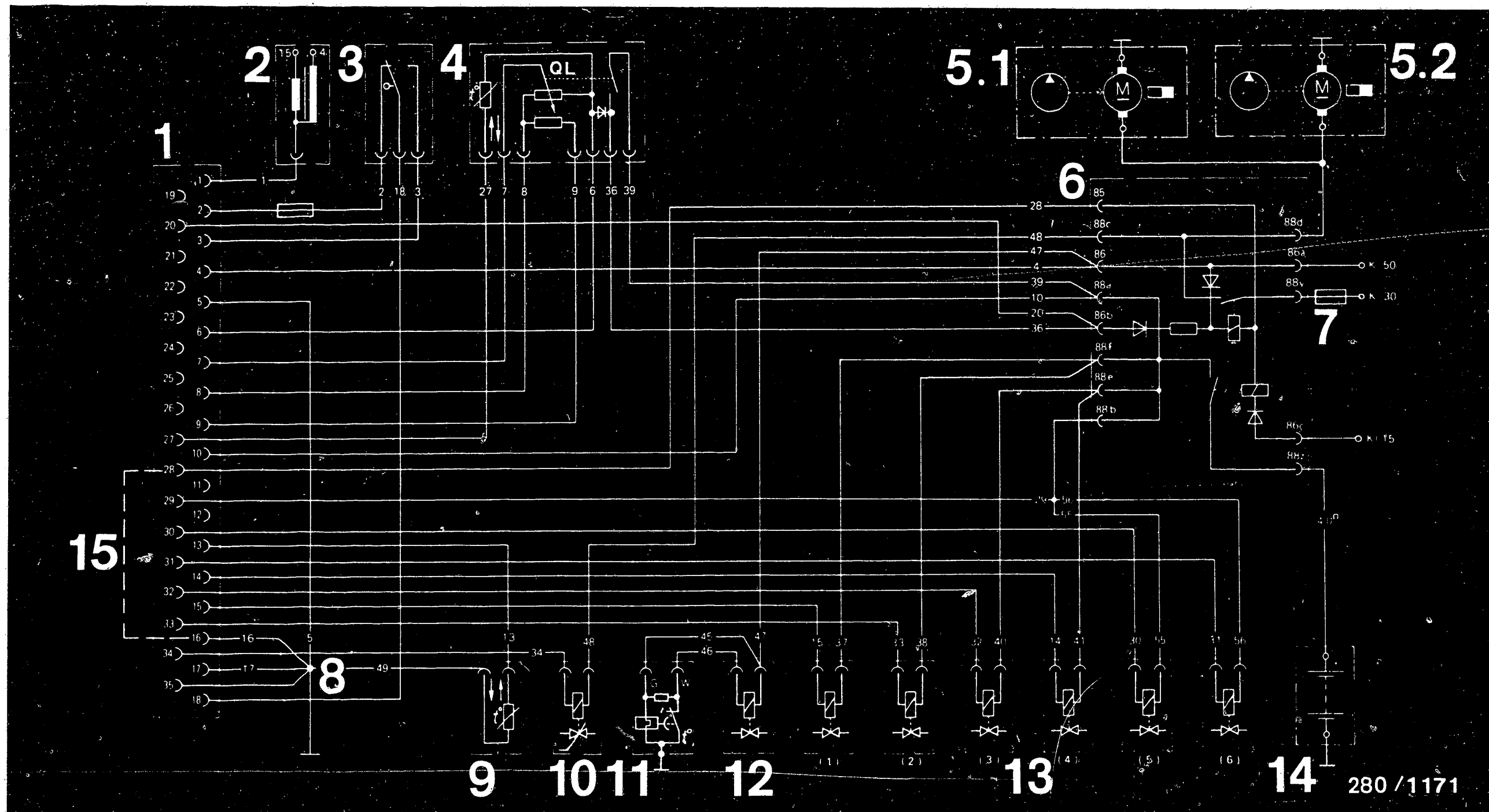
Thermo-time switch 0 280 130 214

- Internal resistance between:
at: "G" and ground "W" and ground "G" and "W"

	"G" and ground	"W" and ground	"G" and "W"
Ambient temp. (less than +30°C)	25...40 Ω	0 Ω	25...40 Ω
Engine at op. temp. (in excess of +40°C)	50...80 Ω	100...160 Ω	50...80 Ω

- Refer to equipment and Autodata Microcard for settings as regards ignition, valve clearance and other engine-related data.





ELECTRICAL TERMINAL DIAGRAM

- | | | | |
|---------------------------|-------------------------------|---------------------------|-----------------------------|
| 1 = Control-unit plug | 5.1 = Electrical fuel pump | 8 = Central ground | 12 = Start valve |
| 2 = Ignition coil | 5.2 = In-tank pre-supply pump | 9 = Temperature sensor II | 13 = Injection valves |
| 3 = Throttle-valve switch | | 10 = Auxiliary-air device | 14 = Battery |
| 4 = Air-flow sensor | 6 = Relay set | 11 = Thermo-time switch | 15 = Jumper in control unit |
| | 7 = Pump fuse | | |

L9

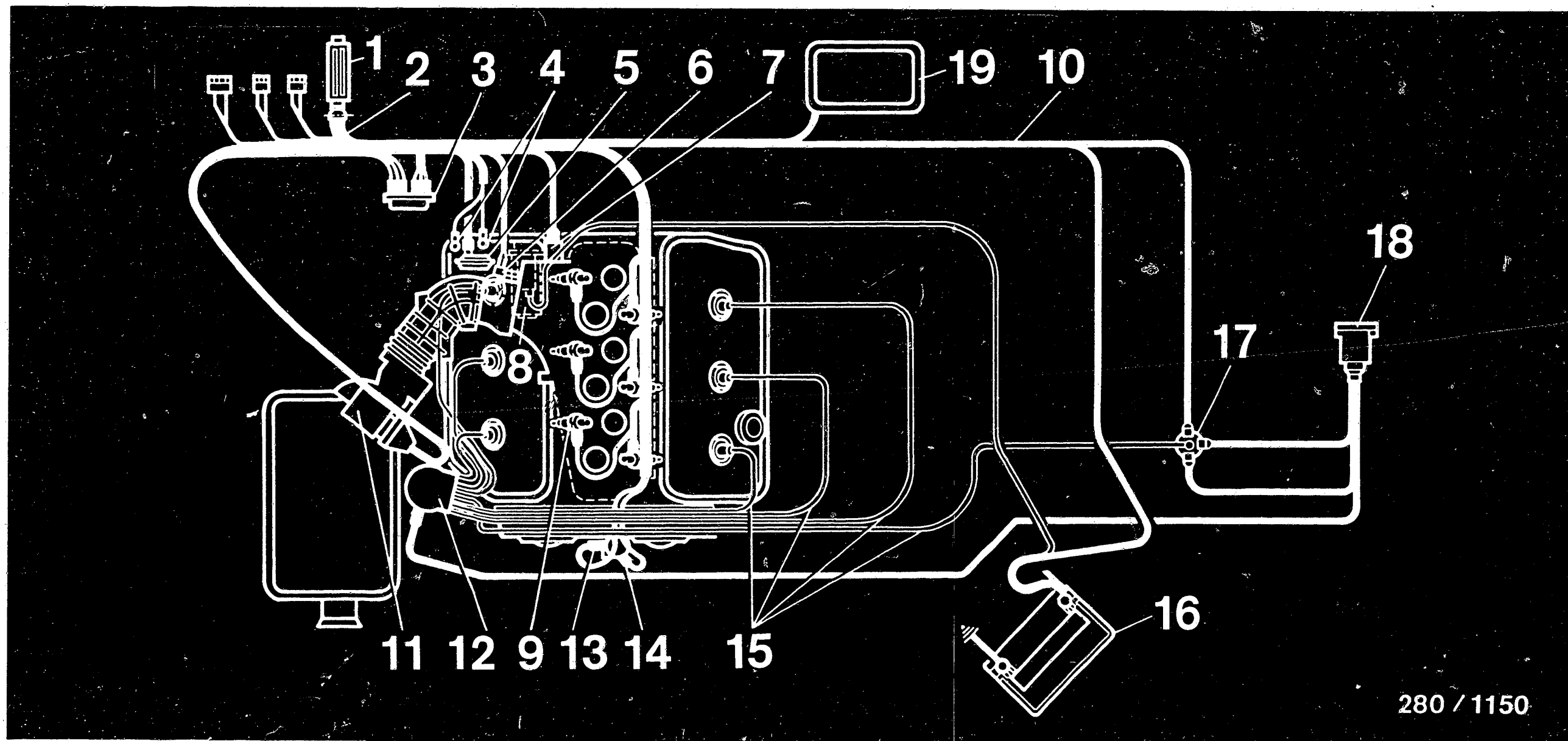
Electrical terminal diagram
Alfa Romeo GTV 6, 75, 90



L10

Electrical terminal diagram
Alfa Romeo GTV 6, 75, 90





280 / 1150

ELECTRICAL WIRING DIAGRAM OF L-JETRONIC AND ARRANGEMENT OF INDIVIDUAL COMPONENTS

- | | | | |
|-----------------------------|-----------------------------|---------------------------|----------------------|
| 1 = Control unit | 6 = Throttle-valve switch | 11 = Air-flow sensor | 16 = Battery |
| 2 = Jetronic wiring harness | 7 = Start valve | 12 = Ignition distributor | 17 = Ignition coil |
| 3 = Relay set | 8 = Starting motor | 13 = Thermo-time switch | 18 = TCI trigger box |
| 4 = Ground terminals | 9 = Injection valves | 14 = Temperature sensor | 19 = Fuse box |
| 5 = Auxiliary-air device | 10 = Vehicle wiring harness | 15 = Ignition cables | |

L11

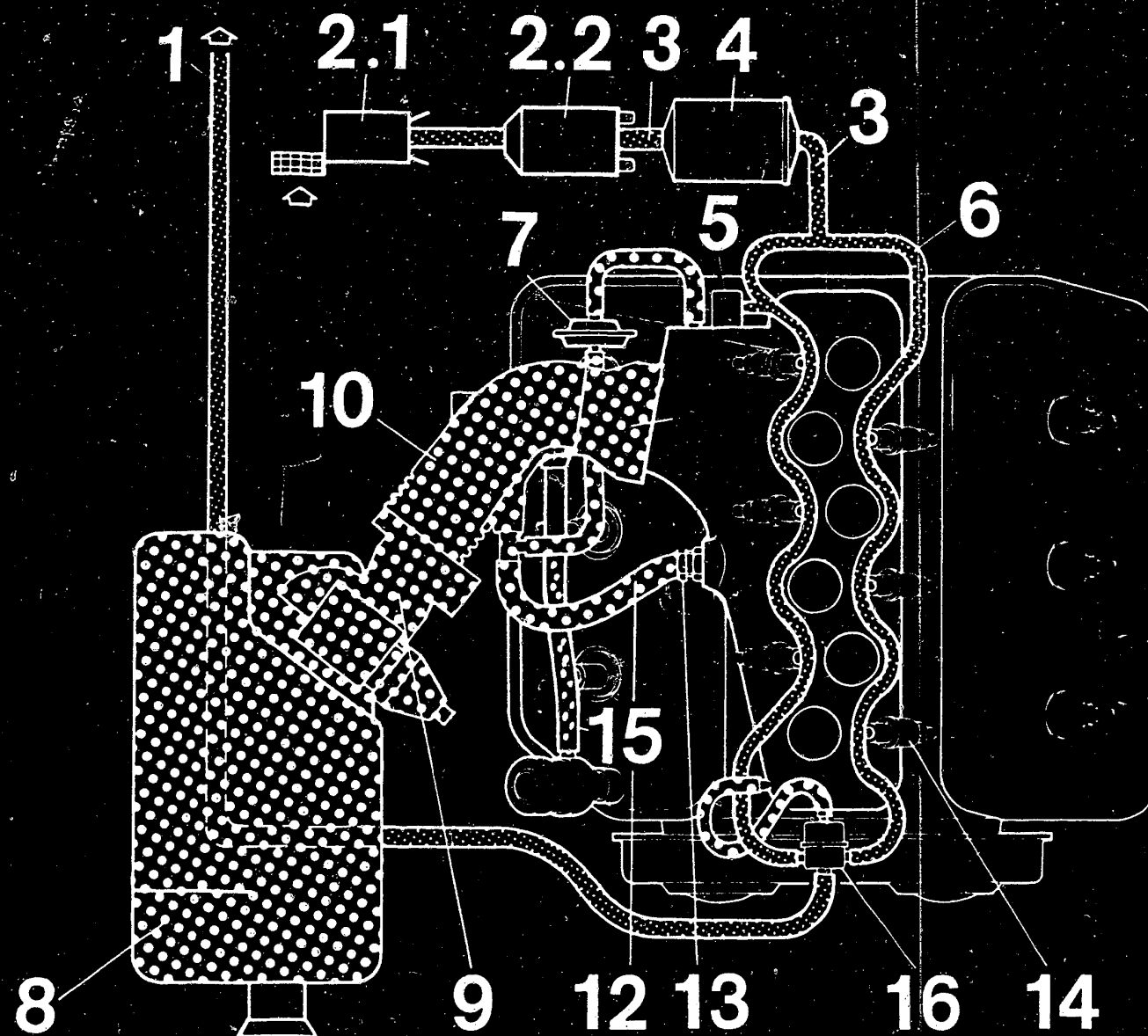
Electrical wiring diagram
Alfa Romeo GTV 6, 75, 90



L12

Electrical wiring diagram
Alfa Romeo GTV 6, 75, 90





280 / 1151

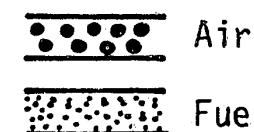
DIAGRAM OF AIR AND FUEL HOSES

- 1 = Fuel return line
- 2.1 = In-tank pre-supply pump
- 2.2 = Electric fuel pump
- 3 = Fuel delivery line
- 4 = Fuel filter
- 5 = Start valve

- 6 = Fuel ring main
- 7 = Auxiliary-air device
- 8 = Air filter
- 9 = Air-flow sensor
- 10 = Air-flow sensor hose

- 11 = Throttle-valve body
- 12 = Idle hose
- 13 = Hexagon nut for idle adjustment
- 14 = Injection valve
- 15 = Crankcase breather

- 16 = Pressure regulator



L13

Diagram of air and fuel hoses
Alfa Romeo GTV 6, 75, 90



L14

Diagram of air and fuel hoses
Alfa Romeo GTV 6, 75, 90



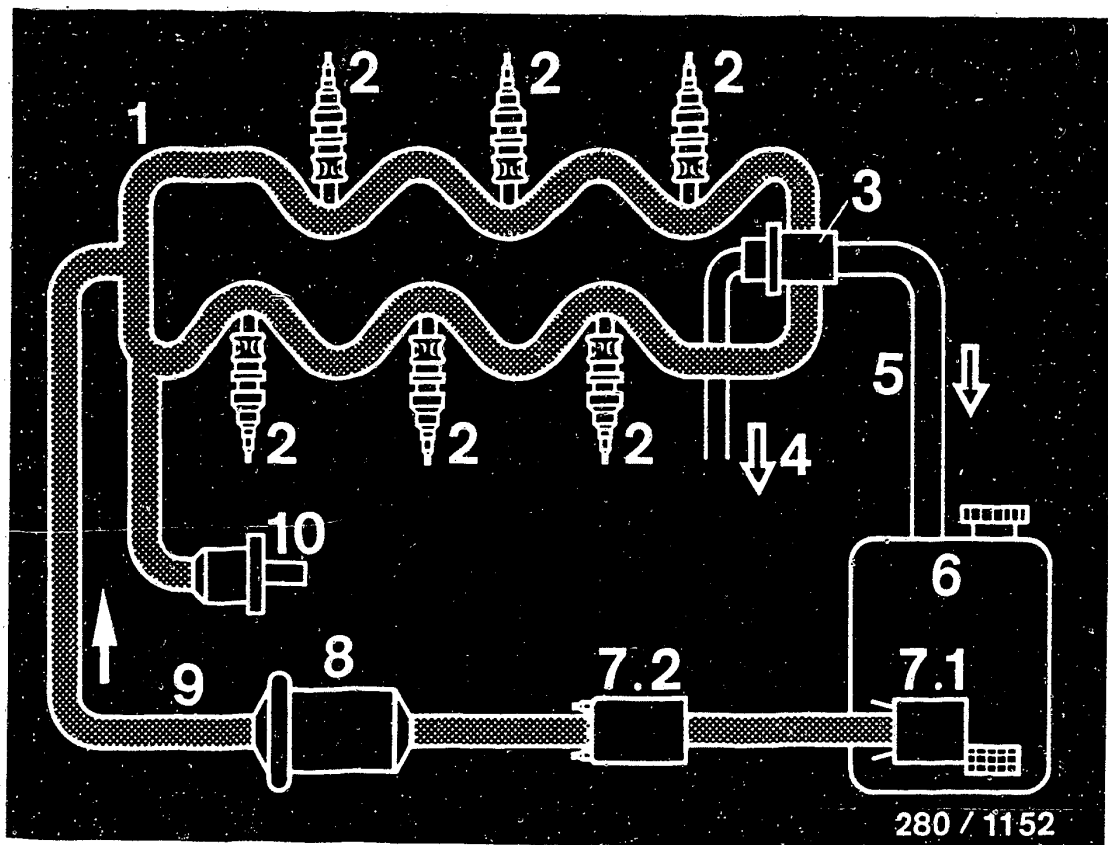

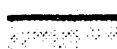
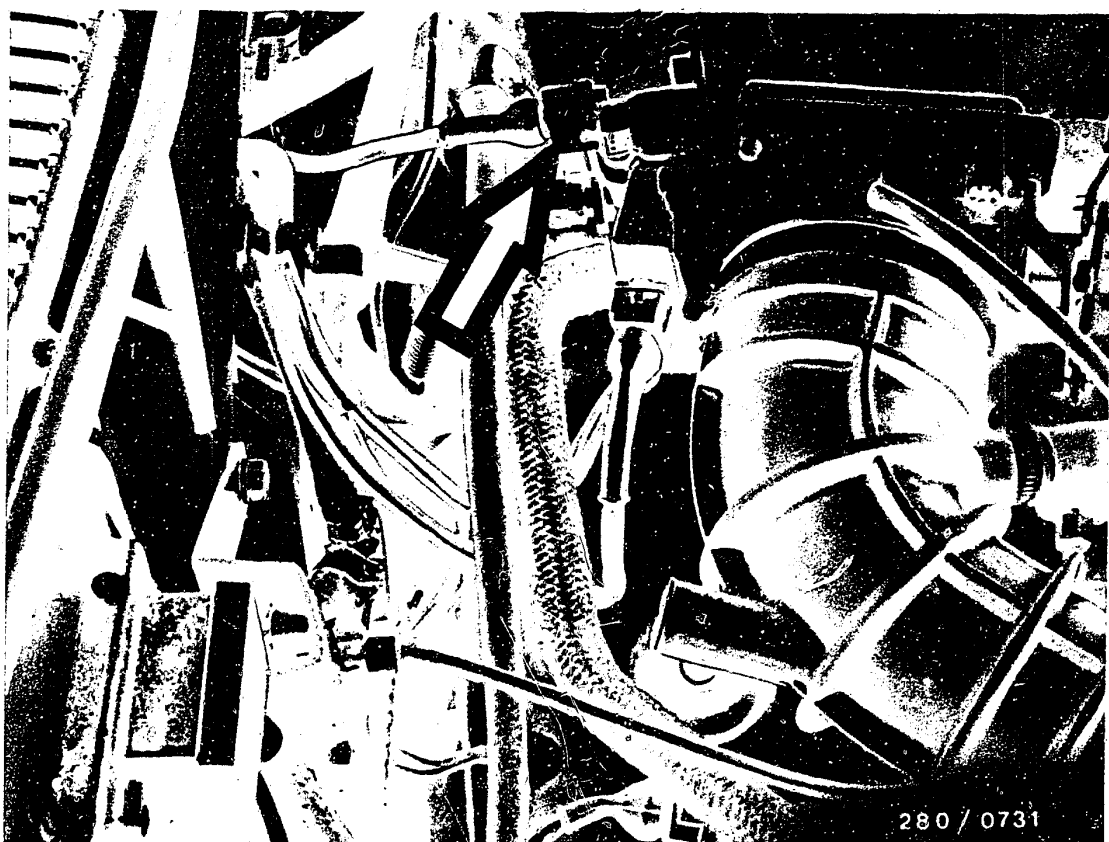


Diagram of fuel lines

 pressureless
 fuel pressure

- | | |
|--|-------------------------------|
| 1 - Fuel-distribution pipe | 7.1 - In-tank pre-supply pump |
| 2 - Solenoid-operated injection valves | 7.2 - Electric fuel pump |
| 3 - Pressure regulator | 8 - Fuel filter |
| 4 - to intake manifold | 9 - Fuel-injection tubing |
| 5 - Return line | 10 - Start valve |
| 6 - Fuel tank | |





Arrow = start valve

FUEL PRESSURE TEST

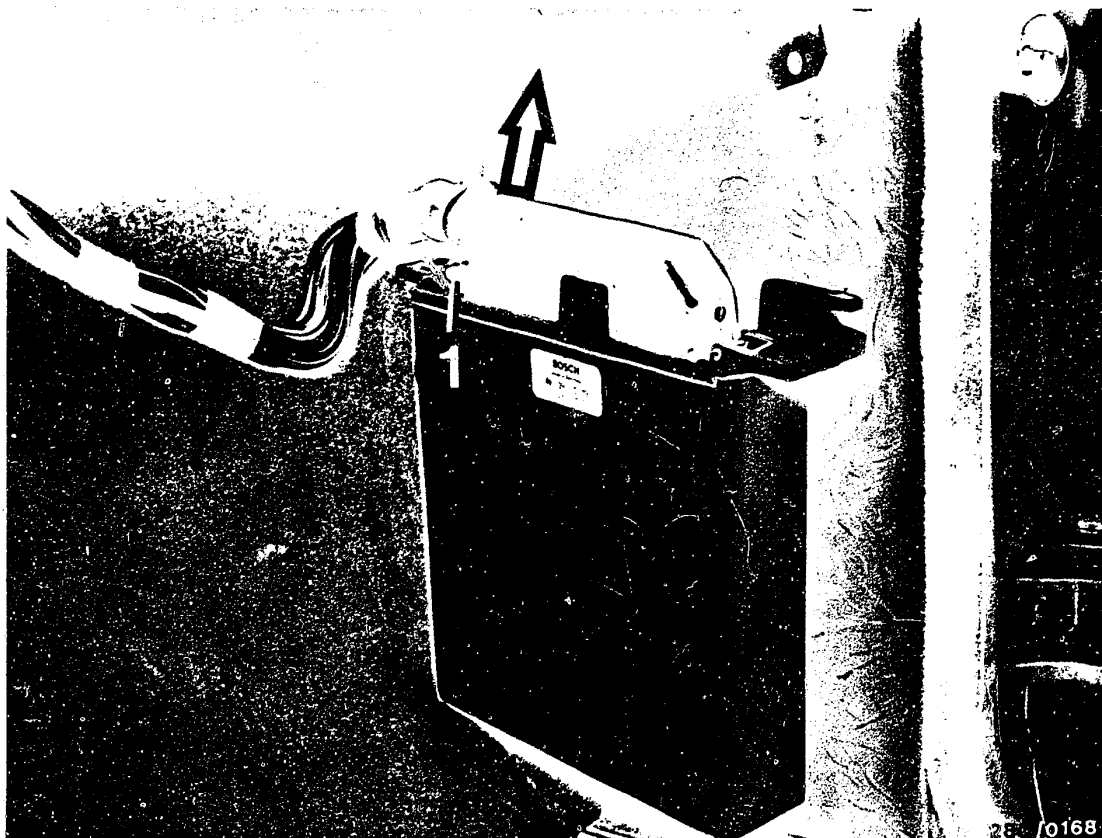
Disconnect hose from start valve (arrow).

Connect pressure gauge.

Make sure there are no leaks at connections.

Do not damage start valve when disconnecting and connecting the fuel delivery hose.





INSTALLATION POSITION OF COMPONENTS

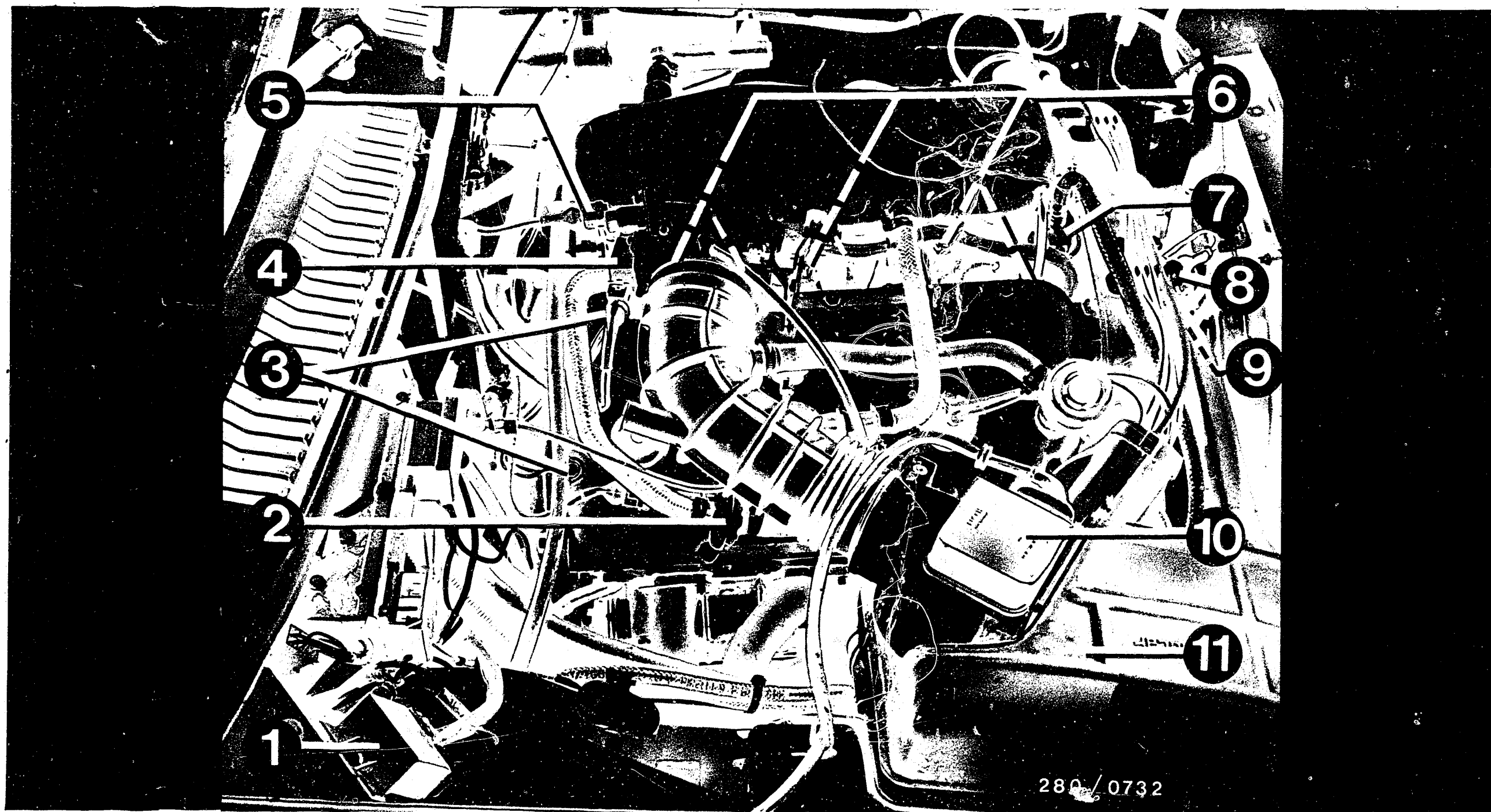
To remove the control unit, remove the side panelling under the glove compartment on the right-hand side in the front-passenger footwell.

Unscrew the 3 fastening screws of the control unit.

Press detent (1) to the rear so that plug unlatches.

Hinge up plug in direction of arrow.





● Arrangement of components on engine

- | | | |
|--|---------------------------|------------------------|
| 1 = Relay set | 4 = Throttle-valve switch | 8 = Temperature sensor |
| 2 = Auxiliary-air device | 5 = Start valve | 9 = Thermo-time switch |
| 3 = Central ground on GTV,
at auxiliary-air device on
90 and 75 models | 6 = Injection valves | 10 = Air-flow sensor |
| | 7 = Pressure regulator | 11 = Air filter |

L18

Installation position of components

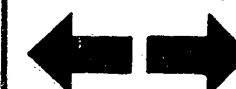
Alfa Romeo GTV 6, 75, 90



L19

Installation position of components

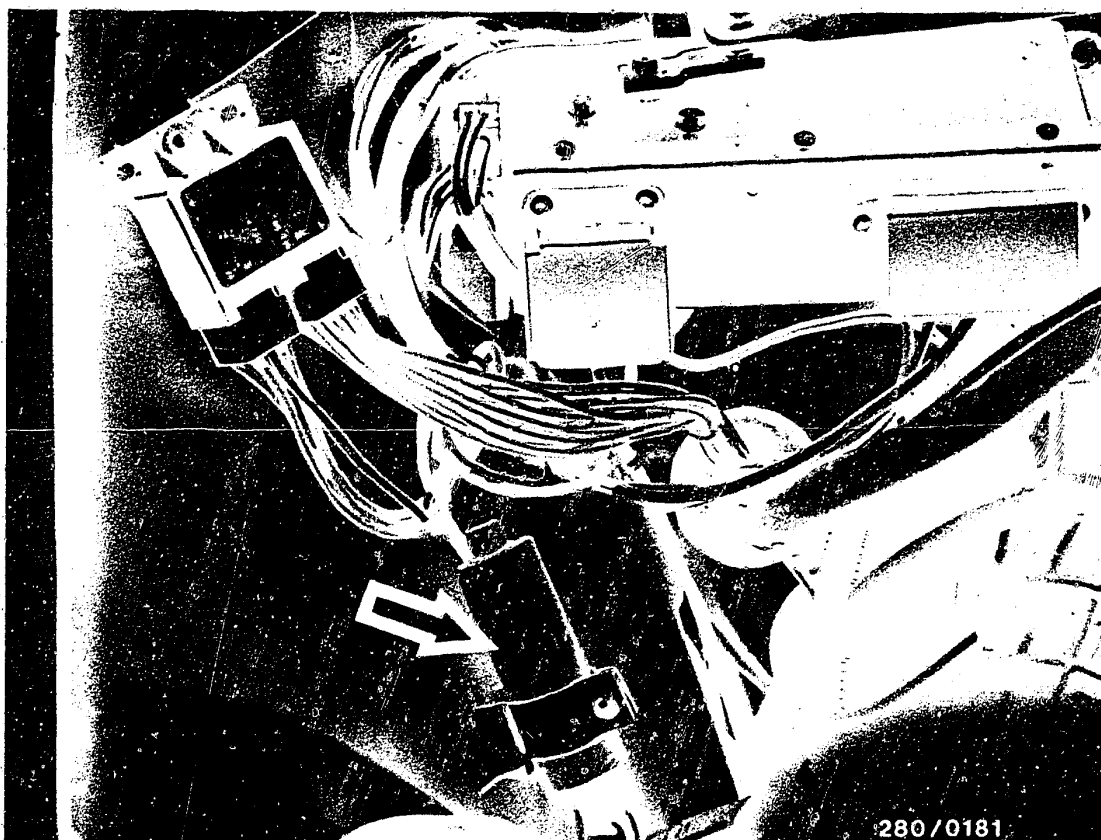
Alfa Romeo GTV 6, 75, 90



Installation position of components (continued)

- Electric fuel pump: Under vehicle, on right-hand side in front of rear axle.
- In-tank pre-supply pump: Accessible via a locking ring at front on fuel tank.
- Fuel filter: Beneath vehicle, on right in front of rear axle.
- Electric fuel pump fuse: In central fuse box no. 7.





Arrow = safety switch

Installation position of components (continued)

The safety switch (Alfa GTV model only) is located in the engine compartment on the right in the direction of travel.

The electrical connections are accessible.

In the case of a serious accident (rolling over) the safety switch switches off the fuel pump.

The pump continues to operate if the knob is pressed downward.

The colours of the connecting leads must match between plug and socket.

